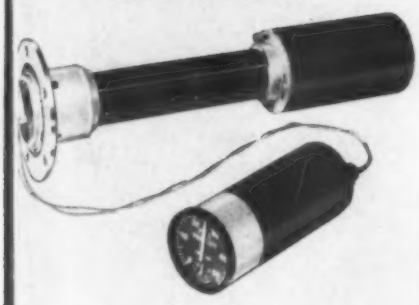
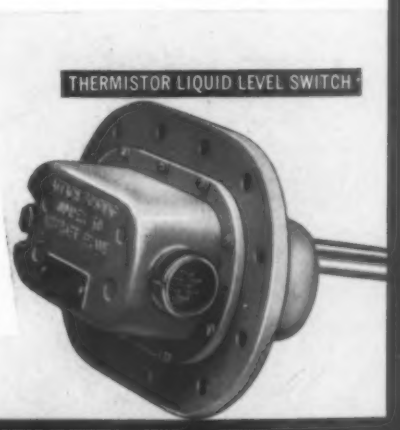
American Aviation





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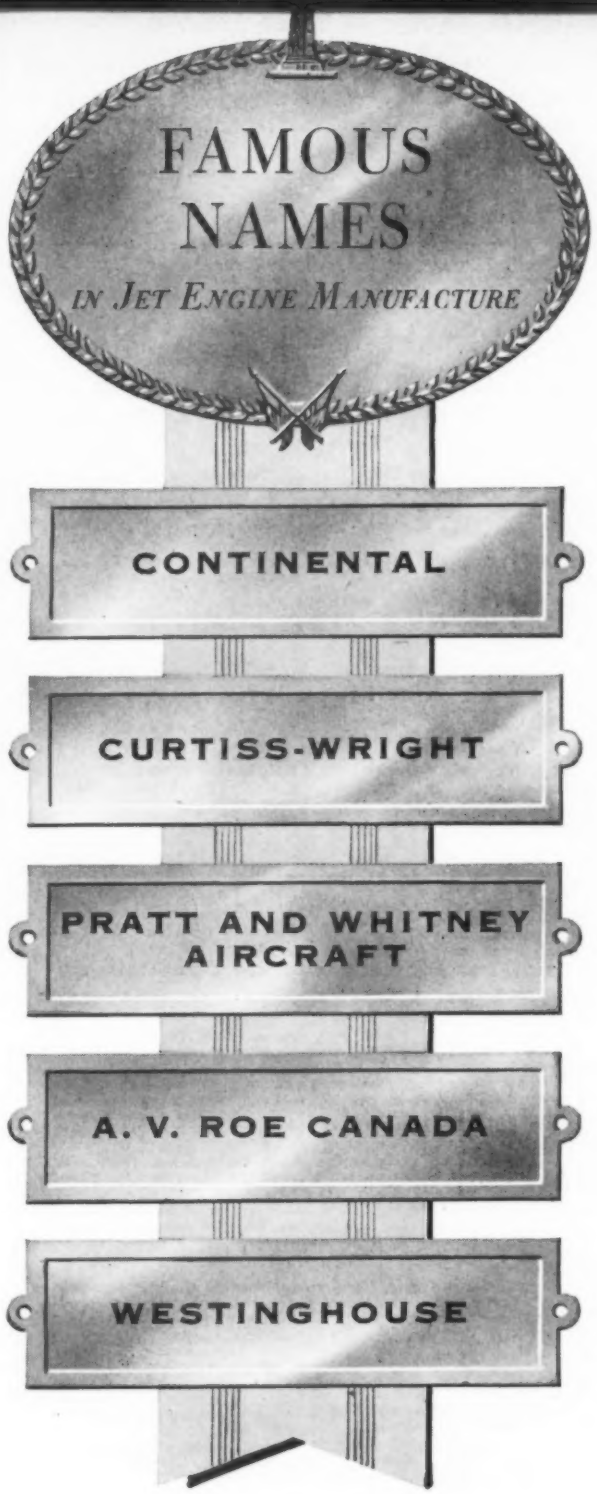

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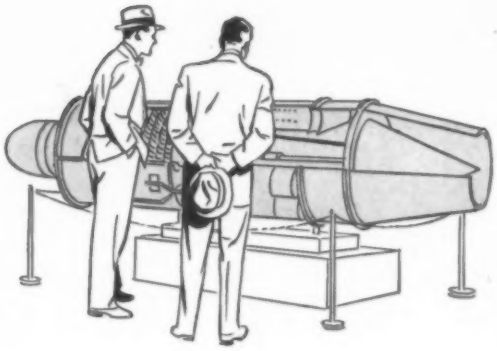

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OTHER PUBLICATIONS AND SERVICES

American Aviation Daily: Daily news service for the entire industry. $200 per year. Managing Editor—Keith Saunders.

American Aviation World-Wide Directory: Twice-yearly listing of products, people, and organizations. $7.50 each. Managing Editor—Marion E. Grambow.

Official Airline Guide: Monthly publication of airline schedules and fares. $13.50 per year in USA; $14.00 in Canada; $15.00 elsewhere. Published from 139 N. Clark St., Chicago 2, Ill. Phone: Central 6-5804. Managing Editor—Robert Parrish.

Air Traffic News (Incorporating Air Traffic Digest): Daily rates and tariff news. $175 per year. Managing Editor—Wallace I. Longstreth.

Airports: Weekly newsletter for airport officials, suppliers, and services. Airmailed every Friday. $25 per year. Managing Editor—Lois C. Philmus.

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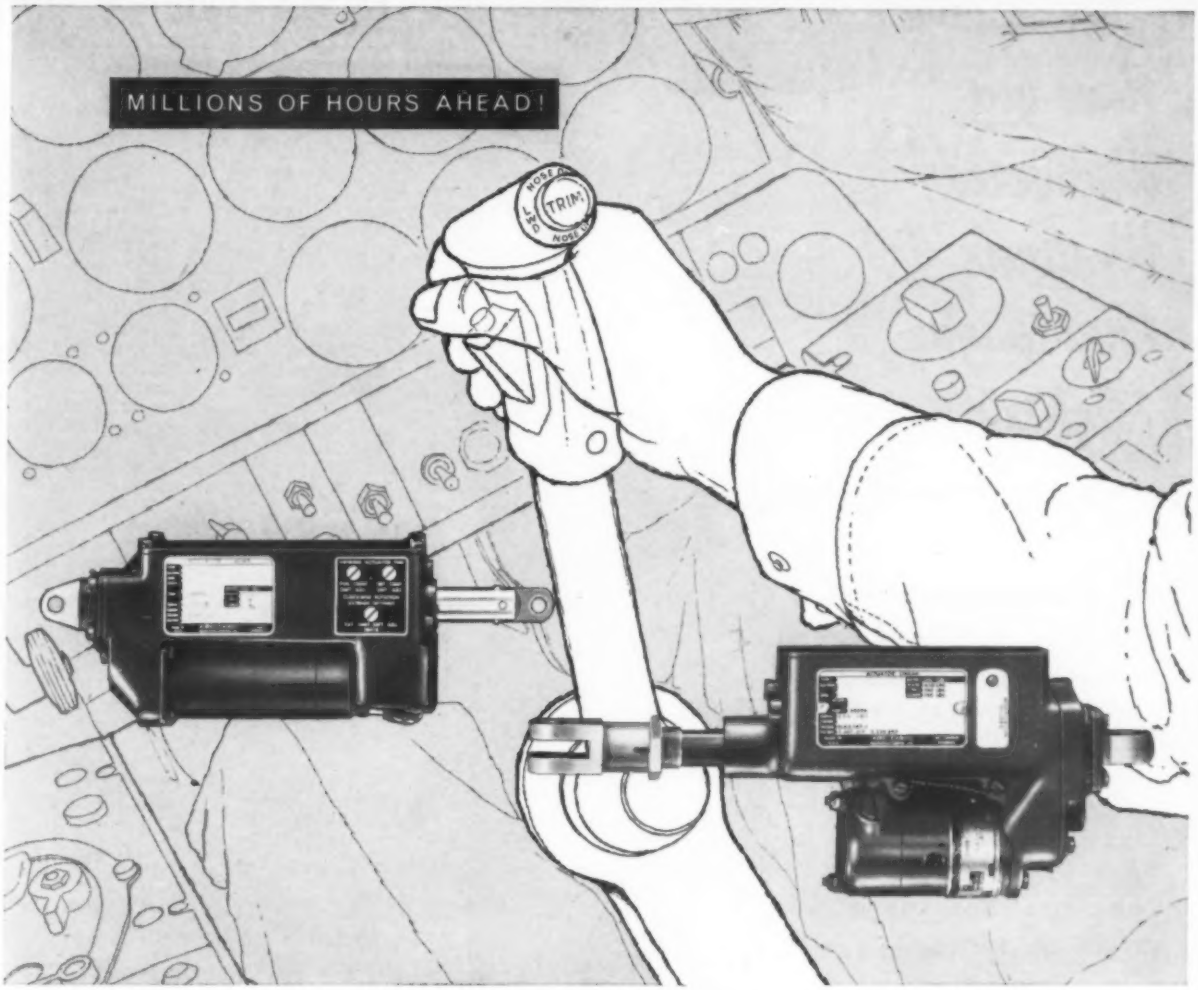

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It is the smallest, lightest unit in this field! Again AiResearch shows its ability to top previous performances with a smaller, lighter power package.

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Circle No. 4 on Reader Service Card.

Letters

Channel Wing No Hoax

To the Editor:

I would like to answer a letter written by Bert K. Sands, Jr., in your Jan. 31 issue. First, I must extend my congratulations to Sands for punching the aircraft industry like he did, as I think he was justified in expressing his feelings as such. Second, I want him to know that the channel wing is not a hoax as he wondered in this article.

For Mr. Sands' benefit, I would like to inform him that the channel wing will some day find its place in the aircraft world. I have personally watched development of this project and have seen this channel wing fly just as Mr. Custer has always said it would. I would like to elaborate a little more on this development, but most of the phenomenal results of test flights are not as yet public information. It is true that the CCW5 flew at 11 mph as previously announced in the newspapers and magazines, and it is a fact that this same aircraft has remained aloft at zero mph on numerous flights. The latest developments have not hit the headlines yet, but, when they do, it will astound many an aeronautical engineer.

If I could get Bert Sands' address, I am sure I could supply him with some information on this project. I also want to say to Mr. Bert K. Sands, Jr., "Your letter to the editor carried a lot of good constructive criticism."

HUBER BOCK, JR.
Hagerstown, Md.

Hotel Comments

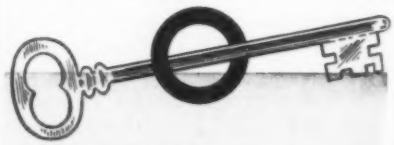
To the Editor:

We thank you for your kind remarks regarding the Fairmont Hotel in "En Route."

It was interesting to read your article and your very constructive thoughts to hotel men are appreciated, I know, not only by me but by all of us in the industry.

DON B. BURGER
General Manager

Fairmont Hotel
San Francisco, Calif.



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Books

Flying Is My Life. *By Hanna Reitsch. Translated by Lawrence Wilson. Published by G. P. Putnam's Sons, New York. Price, $4.00.*

Billed as "the exciting and frank autobiography of the most celebrated aviatrix of Hitler's Luftwaffe," the book was a best seller in Germany. It is peppered with "name dropping"—Goering, Goebbels, Himmler.

The story of the woman pilot's life includes her adventures as test pilot for the first German test planes and her flying exhibitions during world-wide tours. Her associates and close friends in German aviation include Udet, Messerschmitt, Kobis, and Georgii. She even boasts several decorations from Hitler himself. . . . LCP

Jet. *By Sir Frank Whittle. Published by Philosophical Library, Inc., 15 E. 40th Street, New York 16, N. Y. $6. 320 pp.*

This is a tragic story and a revealing one. Inventor Whittle throws discretion to the wind in telling the history of his jet engine. In simple but frank language Whittle tells how he fought the British government, his subcontractors, and his medical advisers in order to shift the jet engine from the patent to the production stage.

Although he was victorious in finally getting support for his program, the battle cost Whittle his health and made him many enemies. No one associated in any way with gas turbines should fail to read this fascinating piece of history. . . . AV

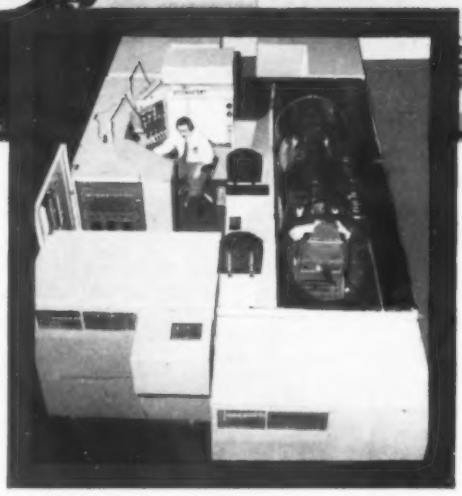
Glass Reinforced Plastics. *Edited by Phillip Morgan. Published by Philosophical Library, 15 East 40 St., N. Y. 16, N. Y. 248 pp. Price: $10.*

The chemistry and properties of various forms of glass fibers and their applications in industry are outlined by a group of authors in this British round-up of the available information on the subject. A chapter on such plastics in the aircraft industry is contributed by Richard Wood, editorial assistant on *British Plastics.* . . . WK

Metal-to-Metal Adhesives for the Assembly of Aircraft. *Edited by R. G. Newhall. Published by Western Business Publications, 274 Brannan St., San Francisco 7, Calif. 64 pp. paperbound. $4.00.*

Design, fabrication, testing, and flight experience with metal adhesives are among the subjects covered in this collection of 12 papers, which were originally presented at a conference sponsored by the AIA and the University of California last September. Sixteen graphs and 41 illustrations. . . . WK

WHEREVER YOU FIND AIRPOWER, YOU'LL FIND LINK!



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BINGHAMTON—NEW YORK

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When & Where

Mar. 8-10—Air Line Pilots Association third annual air safety forum, Shoreland Hotel, Chicago.

Mar. 11—Institute of the Aeronautical Sciences national flight propulsion mtg., (restricted), Hotel Carter, Cleveland.

Mar. 20-23—Aero Medical Assn. 26th annual mtg., Hotel Statler, Wash., D. C.

Mar. 28-Apr. 1—Ninth Western Metal Exposition, Pan-Pacific Auditorium, Los Angeles.

Mar. 28-Apr. 1—American Society for Metals exposition and congress (including all-day session on aircraft and rocketry sponsored by the American Welding Society), Pan Pacific Auditorium and Ambassador Hotel, Los Angeles.

April 5-7—Radio Technical Commission for Aeronautics Spring Assembly Meeting. Los Angeles.

Apr. 16-20—American Association of Airport Executives annual mtg., El Conquistador Hotel, Tucson, Ariz.

Apr. 18-21—Society of Automotive Engineers. Golden Anniversary aeronautic mtg., aeronautic product forum and aircraft engineering display, Hotel Statler and McAlpin Hotel, New York City.

Apr. 18-22—American Society of Mechanical Engineers, 75th anniversary mtg., Baltimore.

Apr. 20-22—American Rocket Society spring mtg., Baltimore.

Apr. 24-28—Airport Operators Council annual mtg., Hotel Olympic, Seattle.

Apr. 27-30—American Helicopter Society 11th annual forum, Mayflower Hotel, Washington, D. C.

Apr. 29—Institute of Navigation's eastern regional mtg., Friendship International Airport, Baltimore.

May 2-5—Society of Aeronautical Weight Engineers annual national conference. Hilton Hotel. Fort Worth.

May 3-5—First International Aircraft Mart Exposition, Will Rogers Memorial Coliseum, Fort Worth, Tex.

May 4-6—Fourth International Aviation Trade Show, 69th Regiment Armory. New York City.

May 18-20—California Association of Airport Executives annual convention, Long Beach, Calif.

May 30-June 5—Aviation Writers Association annual convention, Montreal & Toronto.

June 12-17—Society of Automotive Engineers summer mtg., Atlantic City.

June 21-24—Joint mtg. of the Institute of The Aeronautical Sciences and the Royal Aeronautical Society of Great Britain, IAS Building, Los Angeles.

June 21-24—Aviation Distributors and Manufacturers Association mid-year mtg., Breezy Point Lodge, Brainerd, Minn.

June 23-25—Institute of Navigation annual mtg., Air University, Maxwell AFB, Ala.

Oct. 11-15—National Association of State Aviation Officials annual mtg., Baker Hotel, Dallas, Tex.

INTERNATIONAL

Mar. 2—International Federation of Independent Air Transport (FITAP), mtg. of executive committee, Paris.

Mar. 31-Apr. 1—Symposium on Boundary Layer Effects in Aerodynamics, National Physical Laboratory, Teddington, England.

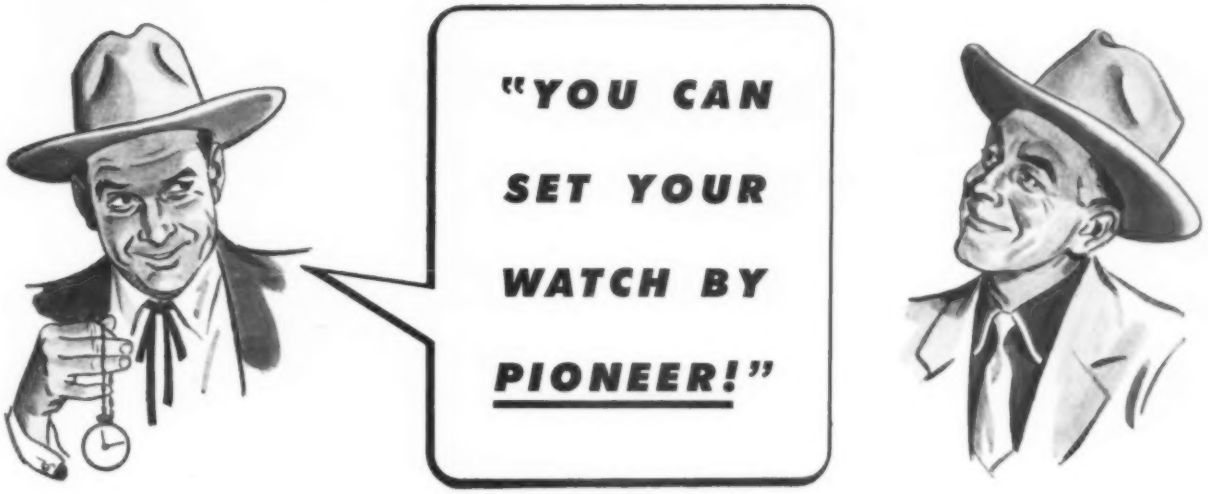
Apr. 5—International Air Transport Association technical conference, San Juan, P. R.

May 30—Fifth International Air Display, Ypenburg, The Netherlands.

May 31—International Civil Aviation Organization Assembly, ninth session, Montreal.

June 10-20—International Aircraft Show, Le Bourget Airport, Paris.

Said The Man From Albuquerque To The Man From Abilene:



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Champion Spark Plugs are in use by every major American air line and a majority of foreign carriers. That is an important fact for every man responsible for the safety, efficiency and maintenance of aircraft.

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United
VARIG, *Brazil*
Western

AIRTRENDS

Washington, D. C., Feb. 28, 1955

RESEARCH ON ATOMIC POWERPLANTS for aircraft would be accelerated under terms of proposed legislation introduced earlier this month. The bill, H. R. 3761, would provide $4.5 million for an atomic reactor for research on atomic-powered aircraft at the National Advisory Committee for Aeronautics' Lewis Flight Propulsion Laboratory in Cleveland, O.

NACA's reactor program, which has the support of the Atomic Energy Commission, has been referred to the Armed Services Committee.

ARMY AND NAVY TESTIMONY BEFORE CONGRESSIONAL committees will get closer scrutiny by security officers prior to publication this year. Defense Department is concerned about the confidential testimony which finds its way into print in the official transcripts each year. System is not watertight, even with review. USAF testimony, which has been reviewed in past years, has, nonetheless, carried its own share of classified data.

AVERAGE HOURLY WAGE OF WORKERS in a typical west coast aircraft plant has gone up a minimum of $1 per hour in the past 10 years. Increases in the 10 labor grades involved have ranged from $1 to $1.15 per hour between 1945 and 1955. Maximum hourly wage for the lowest grade was 80¢ in 1945 and for the highest grade $1.45. Now the maximum in the lowest grade is $1.94 and the top in the highest grade $2.53.

USAF'S GLOBAL AERIAL LOGISTICS SYSTEM has moved from the planning into the practice stage. Some 30 scheduled and non-scheduled air carriers have been asked to bid on airlift of Air Force engines to overseas bases during April, May, and June. Initial contracts, being handled through Air Materiel Command, cover lift equivalent of 10 Douglas C-54's to be leased on a per-plane-mile basis.

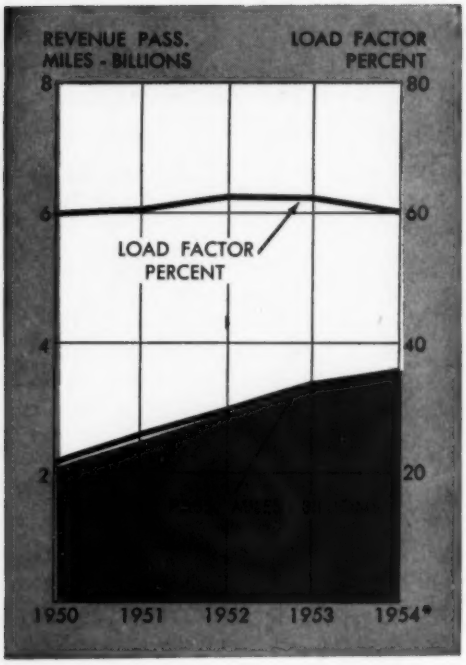
Longer ranging program, to be worked out during initial operations, will increase this to about 50 four-engine planes in the overseas phase. Domestic phase of the engine airlift, called Logair, has been in operation about a year.

TENDENCY OF DEFENSE DEPT. TO PLACE RESEARCH and development contracts with universities is "a matter of concern" to the Aircraft Industries Association. Claim is that primary contracts in applied R&D to tax-exempt institutions is "unfair competition." Objection is not purely financial: Competition for engineers is another factor.

PROBLEM OF ASSURING ADEQUATE AIRCRAFT SPARE parts for NATO countries operating U. S. equipment is getting more attention. U. S. is urging American manufacturers to "anticipate these requirements by making licensee or other facilities available in Europe and Japan."

SINGLE RAMJET ENGINE SPECIFICATION, covering all design requirements for this type engine in guided missile applications, has been prepared by the Aircraft Industries Association and submitted to the Department of Defense for consideration by all branches of service.

TRAFFIC UP, LOAD FACTOR DOWN, ON OVERSEAS ROUTES



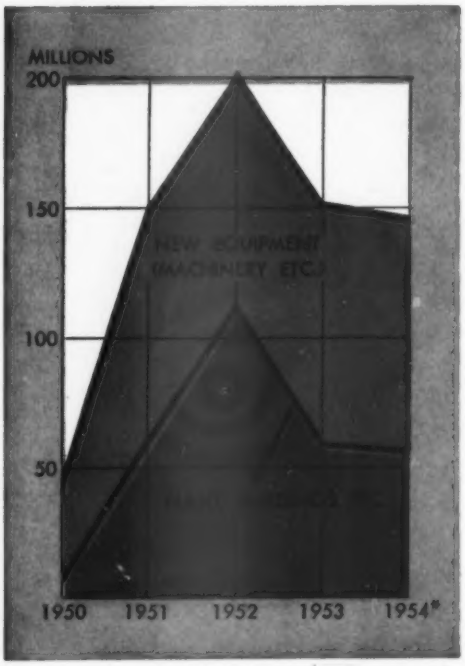
MORE PEOPLE traveled overseas by air in 1954 than ever before, but the rate of increase was less than in previous years. This meant more passenger revenue miles for U. S. scheduled airlines operating outside the continental limits of the United States. But because more airlines offer services competitive with U. S. international and overseas carriers and because the latter also have increased their services, load factors on these routes have been falling off since 1952.

Last year, transpacific service was begun by Japan Air Lines; Air France started non-stop New York-Mexico City flights; and Iberia, the Spanish carrier, launched its transatlantic service. In addition, most other international carriers offered new and more overseas service to further divide the market.

However, there is a bright side to the picture. A spurt in overseas passenger traffic is indicated. The past year closed with a surprising increase in revenue passenger miles when compared with previous years, and early reports indicate 1955 traffic began where 1954 left off. If the indicated increase is projected through 1955, U. S. international and overseas carriers will top four billion revenue passenger miles this year, and this will boost their average load factor by two or three points.

**Based on 11 months*
Source: Civil Aeronautics Board

INDUSTRY SPENDING FOR NEW PLANTS AND EQUIPMENT BELOW 1952 PEAK



BUILDING of the industry that builds airplanes has slowed considerably since the Korea-induced peak of 1952 when U. S. aircraft manufacturers poured $77.9 million worth of new machinery and tools into $125.3 million worth of new plants in order to boost U. S. airpower as fast as possible.

Estimated spending on new buildings and equipment last year was only three-fourths that of 1952, though nearly three times that of 1950, the low point in the postwar aircraft-industry-depression.

Part of the relatively high figure for 1954 results from a carry-over of projects begun earlier and part reflects a stated government policy to maintain ample production facilities rather than face the pyramiding costs of any future crash program to expand the industry.

The emphasis in spending has now shifted from buildings to what goes into them, i.e., machinery and equipment. Money spent on equipment includes new equipment replacing that which has become obsolescent or has worn out and new equipment installed in new plants.

**Based on 11 months*
Source: Bureau of Census

More Air Force for America's Dollars with SIMULATORS

Air Force—Curtiss-Wright teamwork strengthens our defenses, cuts costs by millions. Officially reported in AMERICAN AVIATION Daily:

January 21, 1955 **American Aviation DAILY** Page 128

MATS REPORTS SUBSTANTIAL SAVINGS FROM USE OF SIMULATORS

West Palm Beach AFB, Fla. -- The Military Air Transport Service is saving more than $4,000,000 per year in pilot training costs at its training center here through the use of five Curtiss-Wright flight simulators, MATS officials have disclosed. The simulators involved include three of the Boeing C-97 type and two Douglas C-124 type units, each costing about $800,000.

MATS officials said that these five simulators represent the largest single concentration of multi-engine flight simulators in existence. Although the USAF has taken delivery of 115 of 174 electronic simulators ordered to date, a large percentage of these have been single-engine aircraft simulators.

The first simulator to be installed at the MATS base, which was reactivated in 1951, was a C-97 unit delivered in November 1952. Since then, MATS has accumulated more than 20,000 hours of training time on the C-W simulators and trained more than 1000 crews. During the entire period total down time due to maintenance, during which training could not be made or completed, was only 138 hours 5 minutes. Average training time per day for the five simulators has ranged from 10 hours on the lowest time C-97 simulator to 13 hours on the highest time C-124 unit.

Comparison Values Being Developed

For general comparison purposes, MATS considers that it costs $30 per hour to operate a four-engine aircraft simulator compared with $350-$400 per hour for the aircraft. As yet it has not been possible to say that a given number of flight simulator hours are the equivalent of so much actual flight time but some specific values are expected to be developed by next summer. At present MATS is using several different ratios to gain practical experience on relative merits of the two types of training. In these tests simulator time ranges from one hour per hour of actual flight time, to 20 hours aircraft time to 30 hours simulator time, to 15 hours aircraft time to 38 hours simulator time.

Curtiss-Wright is expected to deliver the first C-118 (Douglas DC-6A) simulator to MATS this summer. It is one of five types of simulators now making up approximately $8 million dollars in simulator backlog at C-W. The other types include simulators for the Lockheed C-121 (Super Constellations), Lockheed C-130, Convair's C-131 (240) and the Boeing RB-52.

* * *

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ROCK NEWS, MONDAY, NOVEMBER 8, 1954

MAX CONRAD FLIES OCEAN WITH GULF

Breaks Record on Non-stop New York to Paris Flight In New Piper Apache

PARIS, Nov. 7—Max Conrad, San Francisco businessman and veteran solo flier, landed his twin-engine Piper Apache at an airfield near Paris today, ending the first non-stop crossing in a plane of such low horsepower since Lindbergh's famous flight in 1927.

The flight took just 22 hours and 23 minutes, setting a new record which beat Lindbergh's time by 11 hours and 6 minutes! During the flight, he used Gulf Aviation Products.

Mr. Conrad kept to his plotted schedule, flying on the regular course north to Boston, Novia Scotia, Yarmouth and Gander, Newfoundland, and going from Gander across the Great Circle route to Shannon and Paris. Shortly before his take-off, Mr. Conrad had estimated that his flight would take about 8 hours a[nd]

Piper Apache used by Max Conrad on his transatlantic trip. This plane is powered by two 150-horsepower engines and cruises at 170 miles per hour.

"I've made five solo flights across the Atlantic in light planes," says Mr. Conrad, "and each flight has renewed my faith in the fine performance of Gulf Aviation Products. I know I can depend on them to get me through."

Before take-off, Mr. Conrad filled up with Gulf Aviation Gasoline, the gasoline that's "refinery-clean," because the pumps that dispense it are equipped with advanced *Micronic Filters* for your safety.

The oil used was Gulf Aircraft Engine Oil-Series R, which is recommended by aircraft engine manufacturers for all types of service. A famous, time-proved lubricant that retards sludge and carbon formation, and retains its body at high operating temperatures. This top-quality, straight mineral oil is used exclusively in all Piper aircraft on leaving the factory.

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GENERAL OFFICES, PITTSBURGH, PA.

Circle No. 9 on Reader Service Card.

HARVEY ALUMINUM: Production at the new plant this summer.

BUSINESS

Weather Report: Fair With Rising Traffic

THE BRISK financial weather which has kept U.S. business happily hustling this winter had its meteorological counterpart in better-than-usual flying weather during most of January. The airlines, as a result, found new traffic records shaping up as the preliminary figures were tallied.

Eastern Air Lines reported revenue passenger-miles up 43% over January 1954, reaching a total of over 326 million. Passenger traffic was up over 31%. United Air Lines reported an increase in revenue passenger-miles of 37% (total: 291 million), and American Airlines chalked up a 25% increase (total: 327 million).

The heavier traffic was felt right down the line, with local service operators reporting increased load factors like Bonanza's climb from 41% to 55%, Mohawk's from 41% to 56%, and Trans-Texas' from 24% to 39%. Revenue passenger-miles on TTA were up 72% over January 1954.

The record-making was not confined to the carriers. On the manufacturing side of the industry, Douglas Aircraft Co. handed a check for $19.75 million to the Treasury as first installment on its 1954 income taxes, the largest payment it had made in its 34 years. Simultaneously, the Boeing Airplane Co. revealed that it had sold a record-making $172 million worth of spare parts in 1954, an increase of $28 million over the year before.

PROFIT & LOSS

Firm	Period	Net 1954	Net 1953	Earnings Per Common Share 1954	Earnings Per Common Share 1953
Alaska Airlines	Yr. 10/31	337,635	546,331	.62	.90
American Airl.	Yr. 12/31	11,431,287	13,413,051	1.51	1.85
Bendix Avia.	Qtr. 12/31	5,983,226	4,753,960	2.63	2.25
Delta Air Lines	6 mos 12/31	440,848	205,188*	.73	none*
Garrett Corp.	6 mos. 12/31	1,681,000	1,440,000	2.31	2.09
Grumman	Yr. 12/31	11,214,853	7,129,341	5.61	3.56
Lake Central	Yr. 12/31	8,863	176,997 (loss)	...	...
Lear, Inc.	10 mos. 10/31	2,149,636	.....	1.01	...
National	Yr. 12/31	1,621,707**	5,413,123**	1.59	5.36
North Am. Avia.	Qtr. 12/31	5,950,000	2,780,000	1.73	.81
North Central Airl.	Yr. 12/31	115,043	114,588 (loss)	...	...
Northeast Airl.	Yr. 12/31	146,112	492,913	...	...
Rheem	Yr. 12/31	6,027,000	4,981,876	3.67	3.63
Solar Aircraft	9 mos. 1/31	1,171,600	1,189,000	1.74	1.78

* Loss after giving effect to $251,000 tax credit and $34,789 profit from sale of plane.
** Includes capital assets gain of $294,153 in 1954, vs. gain of $4,637,041 in 1953.

DIVIDENDS

Firm	Period	Payable	Record Date	Amount
Aeroquip	.....	3/1	2/15	10¢
American Airl.	.....	3/21	3/4	20¢
American Airl. 3½ pfd.	Qtr.	3/1	2/15	87½¢
Atlas Corp.	Qtr.	3/21	2/28	50¢
Boeing	Spec.	3/10	2/17	25¢
Boeing	Qtr.	3/10	2/17	50¢
Eastern Air Lines	Qtr.	3/15	2/18	25¢
Garrett Corp.	.....	3/21	3/10	40¢
Greer Hydraulic	Qtr.	3/1	2/18	10¢
Lockheed	.....	3/11	2/18	60¢
Marquardt	.....	3/15	2/25	100% stock
Pan American	.....	3/11	2/18	20¢
Piper 4½ pfd.	.....	3/15	3/1	5¢
Rheem Mfg.	.....	3/10	2/10	60¢
Ryan Aero.	Qtr.	3/11	2/18	10¢
Solar Aircr.	Qtr.	4/15	3/31	25¢
Solar Aircr.	Extra	4/15	3/31	15¢
United Aircraft	Qtr.	3/10	2/18	$1.00
United Aircraft 5% pfd.	Qtr.	3/1	2/11	$1.25
United Air Lines	Qtr.	3/15	2/15	25¢
United Air Lines pfd.	Qtr.	3/1	2/15	$1.12½
Western Air Lines	Qtr.	3/15	3/2	15¢
Western Air Lines	Extra	3/15	3/2	15¢

CONTRACTS

• **USAF-Navy** obligations during the first half of fiscal 1955 totaled $3.6 billion, leaving $8.9 billion unobligated. During the period, expenditures amounted to $4.2 billion, with unexpended balance of $22.8 billion.

• **North American Aviation's** F-86F fighter-bomber, which went out of production last May, has been reordered by the USAF in a $5 million contract, primarily for NATO.

• **Douglas Aircraft Co.** has received an order for eight more DC-7B's from Eastern Air Lines, bringing EAL's total order to 20. The latest eight are scheduled for delivery in mid-1956.

• **Pratt & Whitney Div.,** United Aircraft Corp., received a $44.5 million contract for J57 jet engines from the Navy.

• **Glenn L. Martin Co.** received a $5 million contract from the Navy for production engineering on its jet minelaying seaplane, the Seamaster, coming on the heels of a contract for the same amount for research and development of the plane.

• **The Texas Co.** will supply 1.26 million gallons of JP-4 fuel each year to Trans-Canada Air Lines Vickers Viscounts. Deliveries will be made at Chicago and Sault Ste. Marie.

FACILITIES

• **Harvey Aluminum's** new facilities at Torrance, Calif. (see photo) are half completed, with production scheduled for this summer. Heavy presses and research and development equipment will be located there.

• **Best Aircraft Corp.,** Newark, N. J., has established an Air-Sea Rescue and Survival Equipment Div., to provide a single source for all such equipment.

IN THIS ISSUE . . .

February 28, 1955

Industry Spotlight

• Allison's 7500-hp turboprop, the T54, is due to make its first appearance in a Republic XF-84H. G-M hopes that the engine (composed of a pair of T56's) will eventually grow to 9000 hp.

• Kaman Aircraft Corp. is evaluating a drone helicopter for the Office of Naval Research. The 'copter, a modified HTK-1, has flown over 100 hours during the past year under control of a ground operator. Flights have been limited to line-of-sight from the operator. A small automatic pilot was developed as part of the program.

• Lockheed Aircraft's turboprop Super Constellation may be dubbed the 1549, instead of the 1449, reflecting changes that may involve both performance and appearance. The higher number is already in use in the firm's engineering department.

• A Gloster Meteor fighter has been flying with thrust deflecting devices since last May. The deflectors were developed by Britain's Supply Ministry and were installed on the two Rolls-Royce Nene engines by Westland Aircraft, Ltd. Deflecting 60% of thrust reportedly cut approach and stalling speeds as much as 20%. The plane is now undergoing more tests.

• Gilfillan's new 200 kilowatt GCA Quadradar is reported to give 40% greater coverage. In field demonstrations the unit tracked F-86's 30 miles away and 20,000 feet up. New transmitter, receiver, and power supply units for the 200 kw version can be simply plugged into the earlier 50 kw model.

• Tubeless tires will make their first appearance on military aircraft on Grumman's F9F-9 and North American's FJ-4 fighters. Goodyear California reports a saving of 40% in tube weight, easier mounting, and cooler running.

• Boundary layer control is due to make an early experimental appearance on the USAF's Chase-Fairchild C-123 assault transport. The aircraft is large enough to make practical the use of the German Arado system, which involves sucking air through slots and requires considerable ducting within the wing.

• Cessna CH-1 helicopter may complete its CAA type certification within the next two months. The rotorcraft has reached an altitude of 12,000 feet and can hover at 9000 feet with its gross load.

• Jet fuel consumption for the USAF's single-engine equipment ranges from 300 gallons per hour for the Lockheed T-33 up to 399 gph for the North American F-86. In comparison, the Martin B-57, powered by two Wright J65's, burns approximately 2150 gph at sea level.

• Custer Channel Wing Corp., Hagerstown, Md., plans to have a business aircraft in production by June. The original channel wing, the CCW-5, is now 30% through CAA certification tests. Custer will name the new plane the Model T and price it between $10,000 and $15,000.

• Cessna's jet trainer, the T-37A, will be coming off the assembly line at a rate of six a month by the middle of 1956, headed for a goal of 17 a month, the company estimates. Between now and May 1956 Cessna will be busy filling its current order for 11 production models of the T-37.

• Boeing test pilots at Wichita have flown more than 10,000 hours in B-47's since production began five years ago, making close to 4700 separate flights.

the man from Esso...

the refueling crew man

This familiar Joe, José or Giovanni and his fellow Esso crew men around the world are important men in the aviation industry. The quality of their services and of the products they deliver is backed by more than half a century of world leadership in the research and development of aviation petroleum products.

Esso refueling crew members are trained specialists who are proud of their jobs. They know that safe and efficient servicing means *faster* turn-around for aircraft. Operators of leading international airlines rely on Esso Marketers for uniform high quality of fuels, lubricants and *service* along the airways of the world.

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Esso

AVIATION PRODUCTS

Personal View

By WAYNE W. PARRISH

"Sinny" Weeks' Bobble

PUT ASIDE for the moment the particular airlines and the particular route involved, but focus attention on the procedural steps in the controversial transpacific route case just recently resolved, and you come up with a shocker of the first order.

We refer to President Eisenhower's reversal of the CAB decision and his subsequent public admission of error and supplementary instructions to the CAB in the transpacific case and specifically his partial reversal of his original reversal of the board on the Seattle/Portland-Honolulu segment. Here was an extraordinary case of mishandling involving the mysterious role of Secretary of Commerce Sinclair "Sinny" Weeks.

When Congress created the CAB it gave this independent agency full and final authority over the air transport system of the United States. But for all routes outside the continental U.S., i.e., to foreign countries or to territories and possessions, the CAB decisions "shall be subject to the approval of the President." Through the years since 1938 the White House has taken an increasing interest in and responsibility for all such international cases until now, it seems, just about everybody can get into the act.

The shocker in the transpacific case comes in two parts. One is the knowledge that the President of the United States didn't even know (and wasn't told) what the CAB decision was. The second is why "Sinny" Weeks accompanied Presidential Assistant Sherman Adams to the President's office to obtain his signature on a letter of instructions to the CAB which only vaguely resembled the board's own recommendations. There can even be a third question asked, and that is why Mr. Adams didn't take acting CAB chairman Chan Gurney with him to the President for the deciding action.

It seems fair to ask whether "Sinny" Weeks, a Boston blueblood possessing only a remote idea of how the rest of the world lives, did not subvert the intent, the language, the purport, and the spirit of the Civil Aeronautics Act by injecting himself actively and directly into procedural steps in which he has no part by statute, morals, ethics, or direct concern.

In short, "Sinny" threw a curve to the President which resulted in considerable embarrassment to the White House. To the full credit of Mr. Eisenhower, the President had the good grace to admit he hadn't been informed of the board's decision. As for Mr. Adams, if he is fulfilling the job of chief of staff for the President, he couldn't have fumbled worse.

Congress has shown signs of dissatisfaction over the way CAB matters are handled in the White House. Well it might. We hope it digs deeply into the interventions and pressures of the Department of Commerce in the affairs of an agency which Congress intended to be independent. It might well inquire also why Under-Secretary of Commerce Robert Blaine Murray, Jr., who resigned effective Jan., 21, accompanied "Sinny" Weeks to the White House Feb., 5 and took a leading part in the hastily called conference on the transpacific case. The whole situation has a mighty foul odor.

Take Off the Wraps

NOW THAT the Air Navigation Development Board has finally brought the VOR/DME-TACAN dispute out on the table where it belongs, there still remains one big missing link without which the job is only half done. That missing link is a complete and unabridged declassification of the TACAN system.

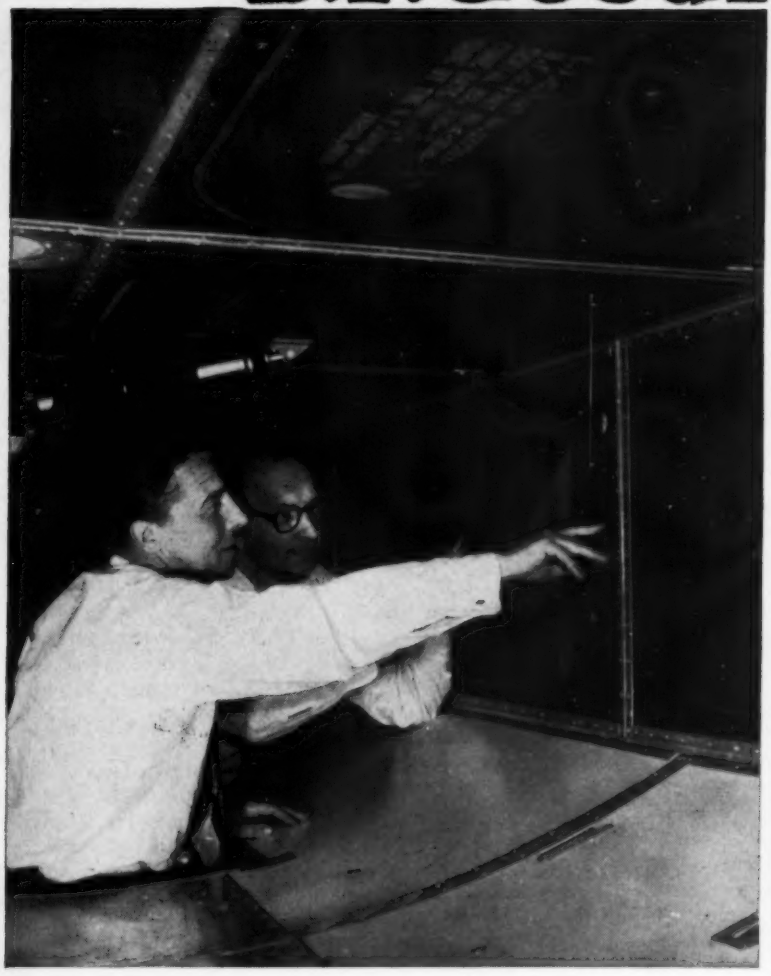
There's no denying that a lot of credit is due Col. J. F. Taylor for his successful effort in getting this squabble out of the closed door atmosphere. But unless the Defense Department cuts the red tape and removes the security wraps from TACAN, much ground will be lost toward ever regaining what aviation once thought it had—a common civil-military navigation system.

Throughout this controversy nothing has stood out more prominently than the poor handling of the whole TACAN project by the military ever since it was conceived. Let's make sure this bungling stops right now and isn't prolonged by some limited technical declassification of the equipment. Such a mistake will not only deprive civil equipment manufacturers and users of information they must have, but chances are that it will imperil the whole common system effort and about every other "coordinated" civil-military venture.

For the Records

ADD worthwhile educational booklets: *Masters of the Air*, designed for both young and adult readers, the story-and-picture history of aviation, published by the Smithsonian's National Air Museum (Washington 25, D. C., 50¢ per copy), and made possible by a grant from the Link Foundation.

RESEARCH KEEPS **B.F.Goodrich** FIRST IN RUBBER



New baggage panel is air-tight yet easily opened, strong yet flexible

PLANS for Lockheed's Super Constellation called for two big baggage compartments in the lower section of the fuselage. But the panels lining the compartments presented some tough engineering problems.

These panels had to seal out air to meet CAA safety regulations. Yet made to open fast for servicing equipment in 33 places. Flexible enough to fit around tricky contours. Yet strong and abrasion resistant enough to take the impact and scuffing of shifting baggage, and resistant to oil, flame and aging.

It seemed like an almost impossible job—even for rubber. Called in by Lockheed, B. F. Goodrich engineers went after the answers. First, they made the panels out of a glass fabric combined with a special rubber compound. Not only did the panels prove age-resistant, oil-resistant and flame-resistant, they had the necessary flexibility, wear-resistance *and* strength. They even passed a severe "guillotine test" that simulated the impact of heavy, sharp-cornered baggage.

Then B. F. Goodrich Pressure Sealing Zippers were added to the panels. The zippers' overlapping rubber lips (see right above) provided a pressure-tight seal against air. Yet they are zipped open quickly and easily to let maintenance men get at equipment on either side and over the compartments.

The new panels completely filled the bill. The picture above left, taken from inside a Super Constellation's baggage compartment, shows panels lining one side and top.

This is one more example of how B. F. Goodrich rubber research and engineering can solve the most difficult aviation problems. B. F. Goodrich products for aviation: tires, wheels and brakes; heated rubber; De-Icers; Avtrim; Pressure Sealing Zippers, inflatable seals; fuel and oil cells; Rivnuts; hose and other accessories. *The B. F. Goodrich Company, Aeronautical Sales, Akron, Ohio.*

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ESTABLISHED JUNE 1, 1937

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American Aviation

VOL. 18, NO. 20

12 CARRIERS REQUEST CARGO PLANES UNDER NAVY LEASE PLAN

BY HARRY S. BAER, JR.

COMMERCIAL air cargo development may be in for a substantial boost if a top Navy official's plan ever materializes.

It could add numerous new cargo aircraft to the commercial fleet, providing needed lift for the industry. It could also give the military a reserve fleet of planes, to be used exclusively for carrying supplies and materiel, in event of another emergency.

SMITH

The Navy official is James H. Smith, Jr., Assistant Secretary of the Navy for Air. The plan, in brief, is for the Navy to buy modern cargo transports for "M-Day" use, but lease them to commercial carriers in the interim. What Smith has in mind is this:

• **Determine** the feasibility of presenting a plan to Congress, asking for money to buy cargo planes for the proposed program.

• **Lease** the aircraft to commercial operators at a price which would return the original capital cost of the planes to the government in a comparatively short period.

• **Establish** a sizeable fleet of such leased transports, which would be immediately available to carry defense materiels in time of emergency.

In so doing, Smith feels this would be a step forward in essential development of the air cargo industry which is in need of cargo-type aircraft. His principal aim at the moment is to find out just how great this need is and how much interest the airlines have in the proposed program.

"It's certainly not a new idea," Smith emphasized when he discussed the matter with AMERICAN AVIATION. "It's been kicking around for a long time. What we have in mind is the first execution of an idea that has been discussed a great deal."

• **The Assistant Navy Secretary** launched the plan on Feb. 2 by leasing a Douglas R6D (Navy version of the DC-6A) to Slick Airways, Inc., Burbank, Calif. Slick had been seeking such a plane from the Navy for some time, Smith explained, and the $1.2 million aircraft was provided "in an experimental program to evaluate the peacetime use of available cargo-carrying aircraft by commercial airlines."

The experimental lease with Slick is for 180 days at $20,000 a month (considered a reasonable rental rate, both to Navy and to Slick, according to transport authorities). In addition, the cargo carrier is paying some $11,000 a month for overhaul and maintenance.

Although a number of eyebrows have been raised by Smith's sudden leasing of the R6D to Slick (Smith is a former director of Slick), the motivating force in this action was to gain information, he emphasized.

"We are seeking proposals from other civil air operators who would like to participate in such a program," the Navy aviation leader noted. "If the Slick project demonstrates the practicability of such a program, similar agreements will be consummated with other carriers on a long-term basis."

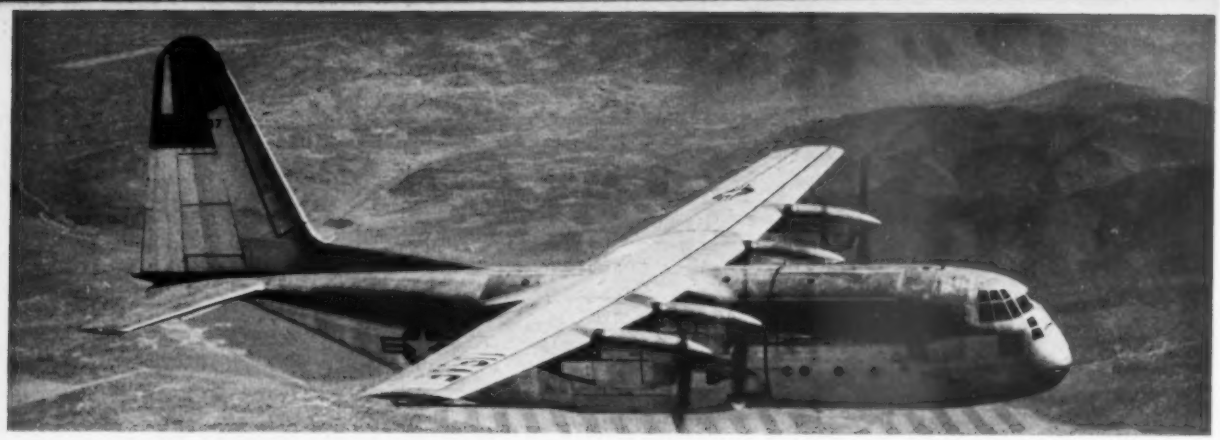
Within a week of the announcement of the R6D rental, Smith had queries from a dozen carriers expressing interest in the Navy plan. These carriers included American Airlines, California Eastern Airlines, Inc., The Flying Tiger Line, Los Angeles Air Service, National Airlines, Northwest Airlines, Inc., Overseas National Airways, Seaboard & Western Airlines, Trans Caribbean Airways, Transocean Air Lines, United Air Lines, and Aviation Corp. of Seattle (Westair Transport).

• **Thus, there has been** considerable early interest in Smith's proposal. Already some two dozen cargo transports have been requested for lease.

If interest in the idea continues in this fashion, the Assistant Navy Secretary hopes to go to Congress soon to seek funds to purchase modern cargo planes for the leasing program. At present, no Navy money is budgeted for the program, he said.

"We would like to complete the groundwork in time for next year's budget (fiscal year 1957)," Smith said, "although I believe it may be possible that

NAVY R7V-1: May be included in plan.



C-130 HERCULES: Possible AF leases in the future.

Congress could provide the money in this session if the plan is accepted."

Although Smith at this stage does not know what his project could result in in the way of new all-cargo transports for commercial carriers, he is now thinking in terms of some 40 freight planes valued at more than $50 million. He pointed out that this "would do the air cargo industry a great deal of good." And it would, of course, mean more orders for the aircraft industry.

At the moment, there are only nine DC-6A's (including the one recently leased to Slick) in commercial operation. This type, a cargo configuration of the DC-6B, is the most sought-after cargo plane and currently considered best suited for this function. However, other types will be considered, such as the R7V (Navy version of the Lockheed Super Constellation) and possibly in the more distant future the Air Force's turboprop-powered Lockheed C-130.

• **Smith has in mind** a five-year leasing program. In the case of DC-6A's (valued at about $1.2 million), this would mean that their cost would be entirely paid off at the end of five years at the $20,000 per month rental rate.

Although the original capital cost would be borne by the government, the cost of replacement and maintenance would be carried by the commercial operator leasing the aircraft. A contract to cover such arrangements would include the following points:

• **The aircraft** will be immediately available to meet the mobilization requirements of the Department of Defense in time of emergency.

• **It will** be maintained in accordance with CAA safety regulations.

• **Full and complete insurance** coverage in favor of the government will be carried by the lessee.

• **The lessee** will be prepared to furnish a crew to man the aircraft upon recall in time of emergency for 30 days.

• **The lessee** will pay a rental comparable to that payable in similar commercial practice (equivalent to normal depreciation for this type of aircraft plus return on the government's investment).

The Navy official feels that the plan has a good chance of acceptance. Having already discussed it with key Congressmen, Bureau of the Budget officials, and Air Force leaders (including Roger Lewis, Assistant AF Secretary, and Smith's counterpart in the AF), Smith said he had received favorable reaction.

He also pointed out the possibility of a joint Navy-AF effort. The AF, of course, has been in the aircraft leasing business for some time with its surplus C-46's and previously with Douglas C-54's.

"We should make it possible for what ever wants to move by air to move by air," Smith explained. "And today commercial operators cannot get commercial cargo planes.

"From the commercial viewpoint, we hope our project, if successful, will bring about the lowest possible cargo rate to support an expanding industry—a rate that will be low enough to induce new business and high enough to buy new aircraft to continually support the operation in the best fashion." • • •

COST IS HIGH, SAYS SLICK

SLICK AIRWAYS officials consider the Burbank, Calif., company's leasing of the Navy R6D "a significant development in air cargo progress."

"It's the first time the Defense Department has leased a modern up-to-date aircraft," one Slick authority noted. "We had been urging this action for some time."

"However, there are aspects of the six-months' agreement with the Navy which makes the rental an expensive operation to the certified all-cargo carrier, he said.

In addition to the $20,000-a-month rent, Slick has calculated it will have to pay out an extra $11,000 monthly to maintain the R6D in accordance with the Navy's staged heavy maintenance requirements. This is money that would not have to be paid if the Navy program were not adhered to. The amount is figured this way:

• **Under Navy standards,** the plane must receive a partial overhaul every 1400 hours. Under commercial standards, it would get a "check" every 1000 hours but not a complete overhaul until the plane has flown 9000 hours.

The Slick official explained that it cost about $5 per flying hour for overhaul (excluding engine overhaul) under the civil procedure while the comparable price is $42 per flying hour under Navy standards. Thus, under the Navy rental at present, the company is paying $37 an hour more, he said.

If the plane is used an average of 300 hours per month the added $37 an hour would total an extra $11,000, he said, which "makes the cost of this plane relatively high."

"But we need the plane very much," he noted, "and we're glad to get it. And, of course, we certainly feel we will make money with it.

TACAN THE COMMON SYSTEM?

BY JOSEPH S. MURPHY

THE BITTER CONTEST over what should be the U. S. Common System navigation aid—civil VOR/-DME or military TACAN—apparently ended early this month with every appearance of a clear-cut military victory.

But within hours of the decision by the Air Navigation Development Board favoring TACAN, it became apparent that the battle has only just begun. Close on the heels of the announcement came these major developments:

• **The decision was referred to every Congressman** on Capitol Hill by its staunchest opponent, the Aircraft Owners and Pilots Association. Within two days the House Interstate & Foreign Commerce Committee queried CAA Administrator Lee on the decision and tabled further talks for future executive session.

• **Radio Technical Commission for Aeronautics'** executive committee scheduled the subject for immediate review. ANDB's decision represents the first major revamping of RTCA's 1948 civil-military Common System agreement, and some observers view the current issue as one threatening the very existence of RTCA unless it can accept or reject the new plan on the same basis that it developed the original Common System.

• **Potential of other Congressional action loomed.** In its last session the House Military Operations Subcommittee scored the Air Force for obligating $82 million in production money for incompletely developed equipment. The TACAN project, reported to involve military commitments of $325 million so far, was found by ANDB's technical consultants to be unreliable and in need of extensive re-engineering.

If true, this adds up to a replica of the situation attacked by Congress, but on a much broader scale. It could touch off another special investigation.

• **Airline position** in the issue- represented by the pro-TACAN vote in ANDB of the Air Transport Association, remains to be clarified. Although the carriers unanimously oppose CAA's views on civil DME as the panacea for traffic control problems, some major airlines have their own ideas on how soon they need a complete navigation system, including distance measurement. Once TACAN is declassified and they can estimate for themselves how long it will take to make this system available, a firm airline opinion will become known.

Faced with the prospect of a hopeless deadlock on the issue after a 4-to-3 split decision of its Vortac Committee, ANDB announced this five-point plan of action with top-level Commerce/Defense sanction:

• **Finish TACAN development** to make it suitable for Common System adoption as soon as practicable.

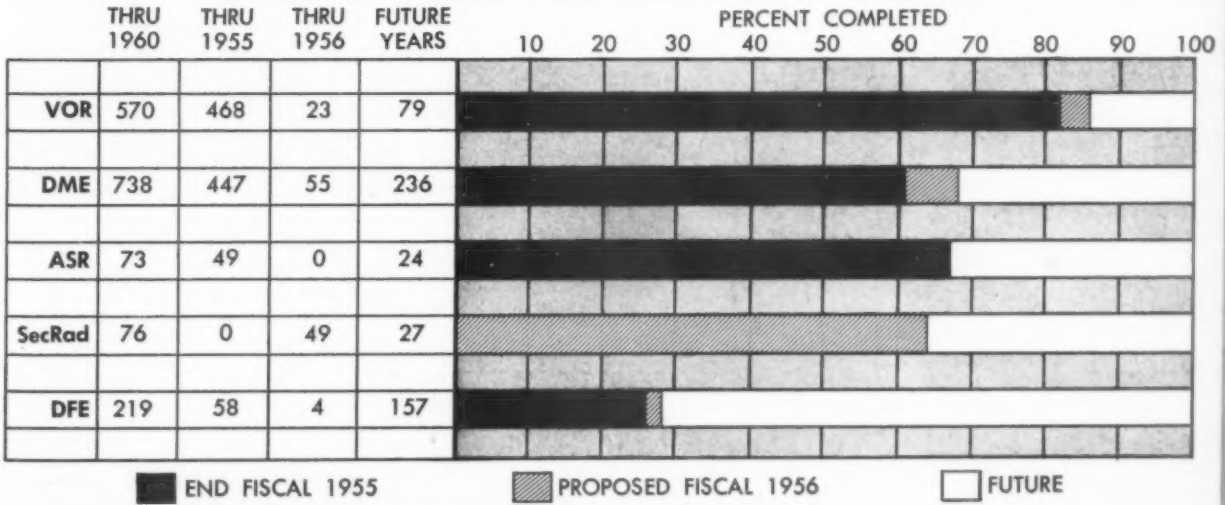
• **Continue VOR** as a recognized Common System aid at least until 1965.

DME ground station near Baltimore's Friendship Airport.

STATUS OF THE COMMON SYSTEM PROGRAM

Table and chart below show the number of navigation units produced and scheduled for completion. VOR—VHF Omnirange. DME—Distance Measuring Equipment. ASR—Airport Surveillance Radar. SecRad—Secondary Radar. DFE—Direction Finding Equipment.

	THRU 1960	THRU 1955	THRU 1956	FUTURE YEARS
VOR	570	468	23	79
DME	738	447	55	236
ASR	73	49	0	24
SecRad	76	0	49	27
DFE	219	58	4	157

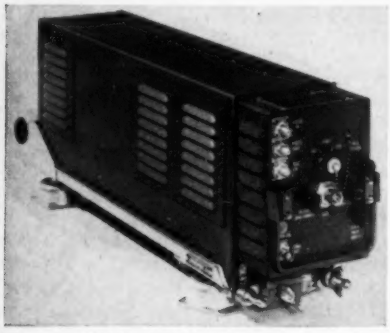


• **Limit Use** of civil DME to experimental purposes with no guarantee of service to users after June 30, 1955.

• **Allow the military** to begin implementation of TACAN on a basis that will not interfere with channels assigned to civil DME and radar beacons.

• **Develop a new** CW (continuous wave) omnirange system in a higher frequency band to back up the TACAN program in case it should later prove unacceptable or inadequate. Present civil DME would provide the distance feature in the back-up system and CAA's network of ground stations will be kept in condition for this eventuality.

Final break in a stalemate within ANDB came on February 5 when former Commerce Under-Secretary for Transportation Robert B. Murray, Jr., (still an ANDB member) overrode CAA's steadfast VOR/DME position and agreed to the TACAN plan. Leading up to Murray's action, the special



BENDIX: DME Interrogator

Vortac committee, formed last year under chairman Milton W. Arnold of ATA, reported the 4-to-3 majority vote favoring TACAN. Behind the majority position were the Army, Navy, Air Force, and Air Transport Association. Opposing were CAA, Aircraft Owners and Pilots Association, and National Business Aircraft Association.

Lack of Commerce support of the Vortac majority position when submitted to ANDB on Jan. 14 led to the formation of an all-government Ad Hoc group to come up with the best possible alternative. Its recommendation—that of a completely new third system—was turned down by the military on Jan. 28 because of the extra time required to develop it for tactical use.

With this dim outlook for any further concession by the military that would bring about a solution, Murray informed ANDB chairman Donald A. Quarles that he saw no alternative but to reluctantly agree with the program subsequently announced by ANDB.

ANDB director Col. J. F. Taylor, in disclosing the decision, emphasized that it by no means adopts TACAN as the Common System short-range aid, but just sets that as the objective. The final program specifies that before any final adoption, these substantial uncertainties are to be explored and resolved:

• **Determination** of final Common System requirements in relation to available frequencies in the TACAN band. Part of this answer will be furnished by an RTCA special committee promptly formed since the ANDB decision.

• **Relationship** between the system and the electronic ground environment being developed for our air defense system.

• **International implications** of any standardization move. The U.S. has spearheaded adoption of VOR/DME in the International Civil Aviation Organization and promoted worldwide implementation. The impact of standardization on TACAN, which would completely reverse past policy, must be carefully weighed. At presstime State Department officials were seriously weighing action through the Air Coordinating Committee to clarify U.S. position on the ANDB decision.

Key to the pro-TACAN vote in the Vortac Committee was the technical report on the competing systems by its 3-man consulting team of R. C. Newhouse—Bell Telephone Laboratories; H. R. Skifter—Airborne Instruments Laboratory, Inc.; and J. B. Wiesner—Massachusetts Institute of Technology.

Conclusions reached by these experts after thorough analysis were: (1) TACAN will provide accuracy to within one degree while comparable accuracy of VOR is three degrees; (2) VOR for basic technical reasons is unsatisfactory when installed on Navy carriers; and (3) VOR/DME does not meet military needs for equipment that can be easily sited in military theaters of operation.

Here's how they size up the various features of the two systems:

• **Siting**—Although both systems must be carefully sited, VOR requires a clearing of 1000-ft. radius and, even then, large objects beyond 1000 ft. may cause large errors. TACAN, too, is difficult to site. However, problems are adequately overcome by elevating the antenna.

• **Accuracy**—The modified TACAN system was found to be better than ± 1° and further refinements could be expected to provide even greater accuracy. Bearing accuracy of present VOR was considered to be better than ± 3° but this accuracy would not be improved by mounting the antenna on a tower.

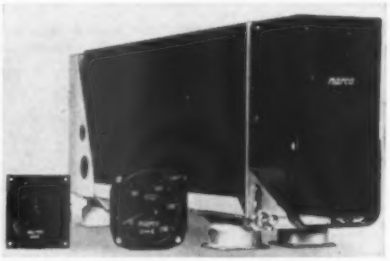
• **Reliability**—Present TACAN equipment was judged unreliable. Extensive re-engineering of both ground

BENDIX: Pilot's Range Indicator

and airborne units would be necessary for them to meet the standards of reliability generally associated with a Common System aid. VOR, they felt, has proven highly reliable in widespread operational use, and ground DME units indicated satisfactory reliability. Although lacking significant operating data on the reliability of airborne DME, they conceded that it too could be made to operate reliably.

• **Size/Weight**—No significant difference was found between the size and weight capabilities of the two systems except that the VOR antenna counterpoise system is much larger than the TACAN antenna. Although the two-package VOR/DME compares with a single ½ ATR TACAN, they felt VOR/DME could be combined and that a lightweight, low-cost azimuth-only TACAN comparable to lightweight VOR's could be developed.

• **Special Applications** — While



NARCO: DME Equipment

TACAN tests indicate satisfactory performance aboard ship, VOR performance on Navy carriers would be unsatisfactory.

• **Timing**—Assuming the final ANDB decision might go in either direction, the consultants gave this estimated timetable required to engineer, evaluate, and set up production specifications for various items of equipment:

Shipboard VOR	1 year
Military DME ground and airborne	12-18 months
Ground/Airborne TACAN of VOR reliability	3 years
Lightweight low-cost azimuth TACAN	2 years

• **Communication**—TACAN cannot be expected to meet the requirement for 2-way voice communications with aircraft, but simple voice identification could be added to it.

• **Frequency Interference** — Before any plan for widespread use of TACAN, the problem of interference with other services in the 960-1215 mc band would have to be carefully studied and resolved, the consultants reported.

Actually, the final ANDB action on the formal adoption of TACAN as a Common System aid is a much more conservative approach than that proposed by the Vortac majority. It recommended immediate TACAN adoption with actual implementation to follow an ANDB improvement program that would bring military TACAN into full alignment with Common System requirements. A target date of 1965 for complete transition to TACAN was considered feasible.

In the meantime, it was proposed that VOR continue as the primary azimuth aid but that civil DME programing be stopped immediately and the ground facilities modified to work with airborne TACAN. In both instances the final ANDB action toned down the avid military-ATA stand.

Sharpest critics of the Vortac Committee study and final ANDB decision are the Aircraft Owners and Pilots Association and National Business Aircraft Association. AOPA general manager Max Karant, a Vortac member, charged that a fair and factual decision was obviously impossible from the start because the military participated from the start on the basis that TACAN was firmly and irretrievably committed for military adoption, and on a tremendous and costly scale.

The only thing within Vortac that could have changed this position one iota, he felt, would have been a flat, unequivocal condemnation of TACAN by the consultants.

Despite the ANDB action, AOPA position was and still is that the consultants' report points to such grave deficiencies in TACAN that their solution is actually a matter of speculation. It predicts that if the system is adopted it will not only spell the end of DME but of VOR as well, based on the contention that Congress and the Budget Bureau will immediately judge it a secondary system and approve none but the most vital expenditures.

Stand taken by NBAA's Cole Morrow in Vortac was that neither VOR/DME or TACAN meet the requirements set up by the Air Coordinating Committee last year and that the present VOR/DME system should be improved and expanded while a 100 megacycle CW omni system having shipboard capabilities was under development. This wouldn't represent any appreciable delay over the TACAN system, Morrow believes, since at least three more years of engineering development work would still be required on TACAN.

For the ultimate Common System navigation aid, he proposed (and ANDB subsequently adopted) a plan for development of a 2500 or 5000 mc system.

As to TACAN acceptance, the former NBAA chairman charged that at the outset of their tests the consultants were astounded at the lack of performance of TACAN and that the delays due to modification to make it usable set the Vortac report back six months. He criticized comparisons of size and weight of the two systems, referring to a Collins Radio Co. report (still classified) estimating that the distance-only portion of TACAN would weigh 55 lbs. compared with 29.9 lbs. for civil DME.

The Collins report, Morrow said, also estimates that this unit could be produced for about $4,000 net cost in lots of 1000 plus an added tooling expense of $500,000. He compares this with net production cost of about $2500 for civil DME by National Aeronautical Corp. in lots of 100, with the conclusion that actual selling prices for TACAN units would be at least double those of civil DME.

What's the next step, now that a decision has been reached? Nobody seems to know except that all agree that complete TACAN de-classification must come before any constructive steps can be taken. Some inkling of ANDB's future plans for finishing TACAN development, assuming the majority position in Vortac is to be followed, appears in the "unclassified edition" of its report: It calls for:

• **Design** of a lightweight, simple model of an airborne distance measuring equipment to work with ground TACAN units. Provision would be made for 250 of these sets to be operated for a thorough, long term, in-service evaluation.

• **Development** of a parallel simple omnibearing system to work with TACAN ground stations. It would be directly comparable in reliability, cost, weight, and size to present airborne VOR's, and 100 would be assigned for long-term evaluation.

One of the big questions, one that will probably go unanswered for a long time to come is: What happens to the operators who took CAA at its word and bought civil DME? A lot depends on what Congress does with CAA's fiscal 1956 funds for DME operation. However, at least one official close to the project feels that when TACAN is finally adopted, the real reason would be to satisfy a purely military requirement. Under those circumstances it isn't out of the question that the services would replace those units with comparable TACAN types. Even at an expense of $1 million, such a solution would represent only a small fraction of the total TACAN cost to date.

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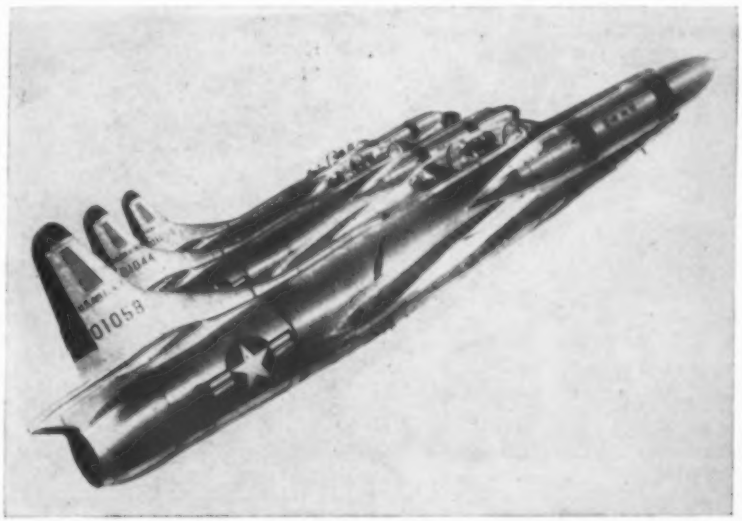

NO SLIPS PLEASE: A team of F-94C Starfire jet interceptors from Otis AFB, Mass. presents a spectacular demonstration of 600 mph precision flying. Each of these Lockheed guardians packs four dozen 2.75-inch missiles.

CAA Enforcement Dispute Picks Up Steam

HOW TO GET more safety in the safest way is a question loaded with the makings of a fine brawl among the airlines, airline pilots, and the Civil Aeronautics Administration.

Last December CAA switched responsibility for enforcing safety regulations out of the Office of Aviation Safety and into the office of its General Counsel. As a result, the airlines and pilots warn, "safety is being jeopardized." Even within CAA there isn't complete agreement on whether the new procedure should be put into effect at this time.

Objectives of the new system, as listed by CAA General Counsel Robert P. Boyle, include:

• **Speed up** handling of enforcement cases by eliminating "channeling" through the Office of Safety.

• **Achieve uniformity** and consistency in enforcement proceedings.

By relieving the safety agent of responsibility for making the actual violation decision, it is reasoned, the agent is put into a better position to establish close liaison with aircraft users.

Pilots and airline spokesmen, on the other hand, contend that the handling of enforcement proceedings by attorneys rather than safety specialists who have first-hand knowledge of the problems may completely discourage existing and affirmative interchange of information between safety agents and pilots. In the past, it is felt, most pilots have willingly reported incidents involving safety so as to find their cause and to cooperate with CAA's safety personnel to prevent recurrence. The pilots feel this method has been invaluable in bringing airline safety standards and records up to their present high levels.

VIOLATION REPORTS AND ACTION TAKEN—1954
CAA General Counsel's Office

Category	Violation Reports	Revocation		Suspension		Withdrawn or Dismissed	
		Non-Hear.	Hear.	Non-Hear.	After Hear.	Non-Hear.	After Hear.
Student ...	268	68	15	41	6	4	..
Private ...	878	37	13	140	41	15	3
Commercial	485	5	3	44	17	5	7
Airline Transport	127	..	..	3	..	1	..
Mechanic .	62	2	1	9	4	..	2
Irr. Air Carrier	26	2	5	..	..	1	1
Air Agency	7	2	..	..	..	2	..
Air Taxi	9	1	..	..	..	..	..
Physical ..	19						
Withdrawn		..	..	..	..	5	4
Denied ..		..	3	..	..	..	..
Issued ..		1	9	..	..	..	..

• **Today safety agents** are required to report all violations, no matter how minor. This is said to put a pilot in the position of having to choose between a desire to cooperate as in the past and a desire to avoid accumulating "incident" memoranda in his file which could be used against him in the event of a future violation report.

The airlines object to the new procedure because it brings attorneys into the picture too soon. The carriers want the Office of Safety to evaluate completely causes of incidents and violations and pass them on to CAA headquarters in Washington, where a final decision would be made whether or not CAA's legal department should enter the picture.

BRUSSELS: U.S. local service airline officials, guests of Sabena on European tour, are (l to r): Sidney McCullough, Ozark; Harold Goodson, Southern Airways; L. J. Eichner, Trans-Texas; R. D. Hager, Piedmont; David L. Miller, Allegheny; Tom Crosen, West Coast Airlines; Andre Seydel, Sabena; R. H. Herrnstein, Bonanza; Keith Kahle, Central; Frank Buttomer, North Central; James Humphrey, Lake Central; Alvin Johnson, Southwest.

The airlines and pilots make it clear that they want violators penalized, but they don't want industry-government cooperation endangered in the process. They point to the airlines' safety record as reason enough for continuing with the system as it was.

One key man in the dispute told AMERICAN AVIATION: "I won't say I would be against this new policy 15 years from now. But right now it is premature. The time has not yet arrived when safety agents should become policemen hiding behind billboards with the CAA counsel as prosecuting attorney. It boils down to a question of whether we want to be practical or merely legal."

Airline and pilot representatives have been meeting with CAA Administrator Fred Lee in an attempt to compromise the change, but so far with no success. At the same time, according to one AMERICAN AVIATION source, the Civil Aeronautics Board has under consideration a declaration of a six months' moratorium on violation enforcement in an effort to encourage the free reporting of all safety incidents as a means of improving traffic and airways control.

Under the new system, the chain of responsibility is as follows:

• **Safety agent** investigates incident. If he finds it to be minor he may issue a *verbal* reprimand, but must also record the incident in a memorandum for the file (a point of controversy). In all other cases he must file a violation report, complete with a technical analysis and safety evaluation, as well as an expression of the degree of the violation in terms of safety.

• **CAA General Counsel** takes over from there. He is responsible for making an enforcement decision on air car-

rier and its personnel, as well as all enforcement for the International Region and Hawaii. Counsel in each of the four regions and Alaska have been empowered to decide all cases from student up to and including non-scheduled carriers.

• **The attorneys,** in deciding which penalty to impose, utilize the agent's report, along with the past record of the violator and all other elements, and act "in the public interest."

• **Four alternatives** are provided for penalized violators: (1) filing for the record; and (2) a written letter of reprimand (for what are deemed minor infractions). Disciplinary action calls for: (1) filing a complaint with the CAB for certificate suspension or revocation; and/or (2) compromising on a civil penalty. Administrative policy is not to impose both forms except in the most flagrant cases.

The method of imposing civil penalties is another sore point. Under law, CAA cannot levy a fine for a safety violation, though it may "compromise" with the violator to have him pay an amount not to exceed $1000.

The system for imposing the penalty has been given much criticism, but this is out of CAA's control. When it is decided that a violation can be compromised by assessment of a civil penalty, the General Counsel's office or the regional attorney sends out a registered letter which states that CAA is willing to settle the matter for a certain amount within the $1000 maximum.

The violator is given 10 days to reply. He is told that his agreement to compromise is not an admission of guilt, although in some cases CAA asks for a guilt admission. If the violator refuses to pay or is not heard from, the matter is turned over to a U. S. District Attorney or the Department of Justice. The government then files a civil suit for collection.

The Aircraft Owners and Pilots Association labels this method "legalized blackmail." It offers the suggestion that legislative consideration be given to transferring authority for levying civil penalties to the Civil Aeronautics Board, rather than the federal courts. "As it stands now," Merrill Armour, AOPA counsel, observes, "there are two different tribunals for imposing two different penalties for the same crime."

Of the overall CAA enforcement policies, AOPA is in general accord.

The accompanying table (Page 28) indicates forcibly a common attitude toward the civil penalty: "It's easier to pay it, no matter what the circumstances, than be tied up in time-consuming court litigations."

The table shows violation reports received by CAA's General Counsel in fiscal 1954 and the types of action taken.

Additional violation reports were received as follows: 32 for scheduled air carriers; 14 for foreign; 14 for cargo; 41 for military; and 7 for aircraft owners. Disposition of the cases is not spelled out in the Counsel's annual report, but the majority were either withdrawn or subject to civil penalty. The scheduled airlines are subject in the main to civil penalties, although CAA has emergency powers under the law to suspend an operating certificate for 30 days, plus an additional 30 days, pending disposition by CAB. In all, there were 2058 violation reports received last year. • • •

STANDING START to 10,000 feet in 71 seconds is the new unofficial climb record set from Lambert-St. Louis Municipal Airport by the McDonnell-Navy F3H-1N Demon.

NEW BILLS IN THE NEW CONGRESS

FLOW OF BILLS pertaining to aviation into the legislative hopper on Capitol Hill has now dwindled to a trickle as the 84th Congress concludes its second month in business. In fact, Congress is only just beginning committee work and hearings on some measures introduced earlier in the session.

One feature in the change in party control has been the substitution of Democratic versions of bills that were introduced earlier by Republican members. Most notable is submission by Sen. Magnuson (D-Wash.), chairman of the Senate Commerce Committee, of a bill making numerous amendments and changes in the basic Civil Aeronautics Act of 1938. A similar bill had earlier been submitted by Sen. Bricker (R-O.)

Only major aviation bill recently was introduced by Rep. Durham (D-N. C.) which would authorize the National Advisory Committee on Aeronautics to construct a $4,850,000 atomic reactor at Lewis Flight Propulsion Laboratory in Cleveland for research on atomic-powered aircraft. Originally included in NACA's annual construction authorization bill (H. R. 2581), and held out largely on the question of proper committee jurisdiction, the measure was introduced again by Rep. Durham.

Aviation bills introduced since Feb. 3, by number, subject matter, and authors, are as follows (for earlier bills see AMERICAN AVIATION Feb. 14):

H. R. 3761 Authorizes the National Advisory Committee on Aeronautics to construct a $4,850,000 atomic reactor at Lewis Flight Propulsion Laboratory, Cleveland, Ohio, for research on atomic-powered aircraft. .....Rep. Durham (D-N. C.)

H. R. 3936 To amend the act entitled "An act to establish Civil Air Patrol as a civilian auxiliary of the United States Air Force and to authorize the Secretary of the Air Force to extend aid to the Civil Air Patrol in the fulfillment of its objectives, and other purposes." .....Rep. Price (R-Ill.)

S. 975 To provide for the issuance of a special series of postage stamps in commemoration of the invaluable service rendered to the United States by Amelia Earhart Putnam .....Sen. Schoeppel (R-Kan.)

S. 985 To establish an Alaska International Rail and Highway Commission. (Asks special commission, after determining the most feasible and beneficial routes for rail and highway facilities between Pacific Northwest and Alaska, to take into consideration the proximity to such routes of suitable sites for airfields.) ....Sen. Magnuson (D-Wash.) and seven western Senators

S. 1081 To amend section 401(e) of the Civil Aeronautics Act, as amended. Authorizes CAB to permanently certificate local service airlines and all-cargo air carriers. .....Sen. Monroney (D-Okla.), for Sen. Smathers (D-Fla.)

PROCUREMENT NOTES

ONE OF THE cryptic sentences approved for the proposed new Defense Department cost allowance principles appears as a new policy in paragraph 15-200-41b. It reads: "Subscriptions. This item includes subscriptions to trade, business, professional and technical publications. Such costs are allowed." Both auditing and procurement officials agreed that the cost of multiple subscriptions for such publications was microscopic when compared to other allowable costs and the value they render to military contractors.

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WHEN DISCUSSING the need for a directive for standardizing aircraft turbine engines, Secretary Charles E. Wilson was reported annoyed when told that by law only military officers have the privilege of ordering any number of models of aircraft and other weapons. While legally correct, Mr. Wilson can order any officer to carry out his wishes. Mr. Wilson then decided to increase the jet engine committee (chairman Mr. Frank Newberry) to six members and include two military jet engine experts, Gen. Marvin Damler of Air Research and Development Command in Baltimore, Md., and Capt. A. L. Beard of the Bureau of Aeronautics.

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INDUSTRY is disturbed by Air Force policy of giving contracts for development of rocket propulsion for guided missiles through Army Ordnance. Units will be made at Red Stone Arsenal, Huntsville, Alabama. Observers believe that deliveries will be delayed and costs considerably higher.

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PENTAGON procurement officials will report to the House Committee on Government Operations that well over 50% of the federal catalog program is now completed and that final completion will be around September 1956. At the first of the year over 1,050,000 items had been identified. Aviation tools, parts, and supplies account for over 30% of the total.

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THE HEBERT subcommittee of the House Armed Services Committee has not definitely dropped its investigation of the Navy's aircraft program. Continuance of its probe may well depend on two field surveys now being made and on reports from several naval aircraft contractors. Secretary Thomas was critized for "hiding behind security rules."

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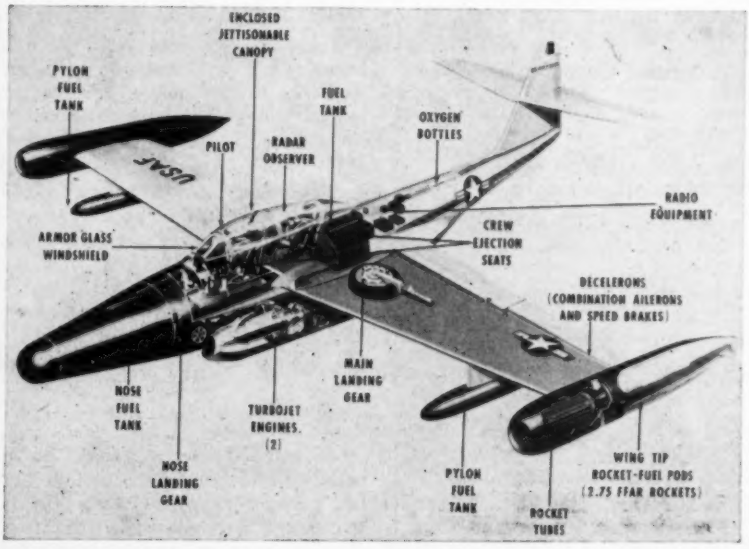
ADMIRAL JAMES S. RUSSELL, new Chief of Bureau of Aeronautics, will find on his desk the beginning of a survey of naval contractural procedures started by his predecessor, Admiral Apollo Soucek. Basis of the probe is the efficacy of the incentive-type contract. Over vehement denials of industry some fiscal officers claim this type of contract allows unreasonable profits. Air Force officials who recently adopted this type contract are now reported disappointed in its results.



INSIDE THE SCORPION: Phantom view of USAF-Northrop Scorpion F-89D has just been released, showing heretofore classified internal details of America's most heavily armed fighter. Note wing-tip rocket fuel pods and fuel tank in nose.

THE NEW proposed cost allowance regulations give special attention to salaries of corporate officials, executives, and department heads. Service auditors are warned that "excessive compensation" may be found where "(1) the individual or member of his immediate family owns a substantial financial interest in the firm; or (2) ownership of the company is limited to a small cohesive group; or (3) the volume of military contracts when related to the contractor's total business is such as to influence the amount of compensation."

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A CONGRESSIONAL subcommittee having to do with military affairs has reports from five aircraft companies giving a list of former service officers now employed or retained in executive capacity and showing their present position, salary, and any service retirement benefits.

Defense Group Setting Up Long-Range Jet Plan

A three-man group has been appointed by Defense Secretary Charles E. Wilson to prepare a directive which will set up a long-range plan for development of turbine engines.

The group includes Frank D. Newbury, Assistant Defense Secretary (Applications Engineering), whom Wilson has designated chairman; James H. Smith, Jr., Assistant Secretary of the Navy for Air; and Roger Lewis, Assistant Air Force Secretary (Materiel).

Wilson stipulated that the group cover controversial subjects included in a directive draft, dated Nov. 22, 1954, which met considerable opposition from the Aircraft Industries Association, adding that the group could consider and approve modifications to the draft.

He also asked that a preferred list of engine sizes be included and also established types of turbine engines to be developed for military aircraft.

In a February 8 letter to DeWitt C. Ramsey, AIA president, Wilson said, "I consider it highly advisable that we conduct this work according to some long-range plan . . . to develop the minimum number of engine types and sizes that will adequately cover the needs of the services . . . at least cost. Over the past few years there have been too many engine development projects that have failed completely or have seriously delayed aircraft production . . . a record with which neither the Department of Defense nor the aircraft industry should be satisfied."

How One Big Company Keeps Small Business Busy

A highly significant analysis of fiscal 1954 purchases by North American Aviation shows how one big airframe manufacturer is spreading its purchasing dollar around.

The summary indicates that 55% of the company's purchases by dollar volume went to small business, ie., firms with fewer than 500 employees. These purchases were spread among 10,265 companies of which 5870 had fewer than 50 employees.

Of major interest is the fact that only five states failed to come out with a share of the North American purchase dollar: Arkansas, Idaho, Mississippi, Montana, and North Dakota.

Of $252,792,054 in total purchases by the four North American plants (Los Angeles, Downey, Fresno, and Columbus), $139,030,213 went to small business firms. Numerically small firms made out even better. While small business concerns got 55% of the dollar volume, 82% of all purchases were made from these same companies with 500 or fewer employees. Companies employing fewer than 50 got 46.9% of this total, those employing 50-199 received 22.4% and those with 200 to 499 received 12.7%.

California companies, as could be expected, were top recipients, pulling down a total of $152,201,172. Ohio, location of the company's Columbus Division, was next with $32,701,609.

WHERE THE NORTH AMERICAN DOLLAR WENT

	Los Angeles Plant		Downey Plant		Columbus Plant		Fresno Modification Center		Total	
	Dollar Value	Pct.	Dollar Value	Pct.	Dollar Value	Pct.	Dollar Value	Pct.	Dollar Value	Pct.
Concerns with Less than 50 employees	$ 34,098,393	21.2%	$ 6,530,737	18.3%	$11,226,341	20.5%	$ 434,279	41.1%	$ 52,289,750	20.7%
Concerns with 50 to 199 employees	37,209,362	23.1%	5,768,944	16.1%	12,682,162	23.1%	196,052	18.6%	55,856,520	22.1%
Concerns with 200 to 499 employees	21,216,454	13.2%	3,741,488	10.2%	5,834,355	10.6%	91,646	8.7%	30,883,943	12.2%
Total of Small Business Purchases	$ 92,524,209	57.5%	$16,041,169	44.6%	$29,742,858	54.2%	$ 721,977	68.4%	$139,030,213	55.0%
Purchases Not Obtainable From Small Bus. Concerns	48,540,926	30.2%	15,550,000	43.2%	16,527,354	30.1%	316,794	30.0%	80,935,074	32.0%
Purchases on Which Small Business Firms Were Not Competitive	19,835,538	12.3%	4,374,941	12.2%	8,599,079	15.7%	17,209	1.6%	32,826,767	13.0%
Total Large Business Purchases	$ 68,376,464	42.5%	$19,924,941	55.4%	$25,126,433	45.8%	$ 334,003	31.6%	$113,761,841	45.0%
Total Purchases From All Concerns	$160,900,673	100%	$35,966,110	100%	$54,869,291	100%	$1,055,980	100%	$252,792,054	100%

WHERE THE PURCHASES WERE MADE

	Los Angeles Plant		Downey Plant		Columbus Plant		Fresno Modification Center		Total	
	No.	Pct.	No.	Pct.	No.	Pct.	No.	Pct.	No.	Pct.
Concerns with Less than 50 employees	2133	54.1%	1798	48.7%	1424	36.4%	515	52.9%	5870	46.9%
Concerns with 50 to 199 employees	822	20.9%	827	22.4%	973	24.8%	188	19.3%	2810	22.4%
Concerns with 200 to 499 employees	426	10.8%	502	13.6%	562	14.3%	95	9.8%	1585	12.7%
Total Small Business Concerns	3381	85.8%	3127	84.7%	2959	75.5%	798	82.0%	10,265	82.0%
Total Large Business Concerns	560	14.2%	563	15.3%	959	24.5%	175	10.8%	2257	18.0%
Total Business Concerns	3941	100%	3690	100%	3918	100%	973	100%	12,522	100%

North American's report goes on to show the following breakdown of its total disbursements for fiscal 1954, including payroll:

Total Disbursements $632,971,469
(Includes materials, supplies, services, and payrolls. Does not include general office miscellaneous payments, e.g., federal taxes, dividends, payments on notes, etc.)

Disbursements for materials, supplies, and services made outside of North American Aviation, Inc. $381,115,873
(Does not include payrolls and general office miscellaneous payments.)

Percentage of disbursements made outside of North American Aviation, Inc. to total disbursements as described above 60.21%

With a $30 Million Aviation Business

Twin Coach Takes A Busman's Holiday

BY WALTER A. KILRAIN

THE PROBLEMS of the smaller manufacturing firms have been receiving increasing attention from government and industry, but so far no one has recognized the problem which faces the aviation division of the Twin Coach Co.: how to do $30 million a year of aviation business while working under the name of a bus manufacturer.

The Buffalo subcontractor has managed to thrive despite this handicap, as is demonstrated by the $30 million figure for shipments during 1954, and by the recent announcement that it would build vertical fin and rudder units for Boeing's jet tanker/transport. If its seven-year record in the industry is any indication, the firm's name may before long become as well known in the air as it has been on the ground.

During the lean years that followed World War II, many aviation manufacturing men found themselves building a variety of products which bore little resemblance to airplanes—from pressure cookers to aluminum canoes. In Buffalo, N. Y., when the Curtiss-Wright plants were closed in 1946, about 1000 supervisors and workers created a new division for the Twin Coach Co., which was eager to start filling a backlog of orders for buses. With Curtiss personnel, and a building on the edge of the Buffalo airport purchased from the Reconstruction Finance Corp., the new division set to work.

• **Before the war** Twin Coach had turned out 1½ buses a day. With the production capacity of Buffalo added to the original plant in Kent, Ohio, the firm raised its shipments to 10 a day. During the next three years the Buffalo division turned out approximately 1700 aluminum coaches. By then the demand for buses had slacked off, international tensions had increased, and the Buffalo organization was edging back into the aviation industry.

Aircraft production began late in 1948 with an order from Grumman Aircraft, and the last bus rolled off the line the following March. Since then the division has subcontracted cockpit enclosures and drop tanks for Republic Aviation; spars for Fairchild, North American, and Chase; fuselages for Piasecki HUP-2 and HUP-3 helicopters; flaps for the Boeing B-52; and a long series of orders for its charter customer, Grumman.

• **Between 1946** and the present, employment at the Buffalo division rose from 1000 to a peak of 3600, later reduced to its present figure of some 2100. Total floor space now owned or leased by the division is more than 400,000 square feet. An additional 50,000 square feet is due to become available soon, as the nearby Cornell Aeronautical Laboratory vacates some space. A $2 million group of seven hangars is being built by Twin Coach at the airport for rental to CAL, American Airlines, and Capital Airlines. The division's sales last year accounted for 75-80% of Twin Coach business.

The continuing growth of the division is the result of a fund of experience in aviation which in some men stretches back 20 or 30 years, plus a wide variety of manufacturing facilities. All executives and top engineers came from C-W, led by John J. Lee, general manager and executive vice president of Twin Coach. He had been general manager of the Curtiss-Wright Buffalo plants before the 1946 exodus. Sales manager G. R. Hecht has been in aviation for 20 years, and works manager S. N. Smith for 29.

LEE: "We make the same noises."

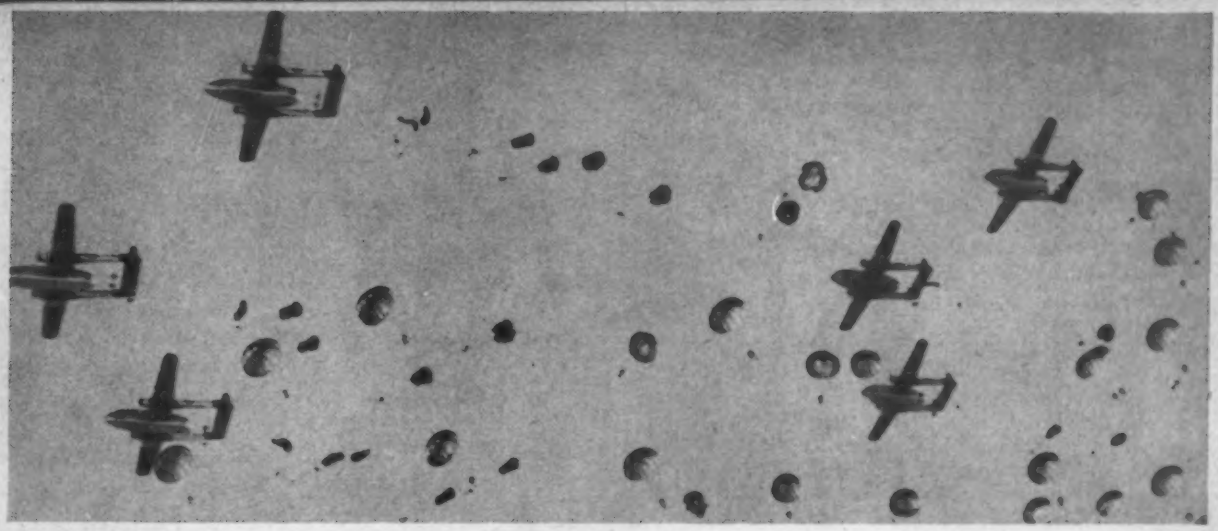
Even the experience accumulated in the bus business proved valuable, Lee recently told AMERICAN AVIATION. "We learned how to put changes in quickly, how to change tooling in 15 minutes, and how to use one tool to do several jobs," he said. Tooling costs in aircraft work have been cut as a result of the techniques learned.

• **Part of the reduction** in tooling costs is credited to the use of dies made of phenolic-impregnated wood, called "Compreg." These cost less than half as much as conventional methods, as little as 25% of the price of steel. They can also be turned out in 1/5 to 1/3 the time, and when no longer needed can be cheaply altered instead of being discarded, as with steel or Kirksite.

Production equipment includes four spar mills (two with 75-ft. beds), a skin milling machine, a Verson Wheelon hydraulic press with 10,500-ton capacity, and a 25-ft. planer mill. The firm is now considering purchase of a quarter of a million dollars worth of metal bonding equipment. How far it goes into such techniques will depend upon the reaction of its customers, the prime contractors.

Although Lee declares that nothing short of all-out war would justify an attempt by Twin Coach to become a prime contractor, the division hopes to match the facilities of the larger manufacturers in variety if not in volume. "We make the same noises as all the prime contractors, but to a lesser degree," says Lee. With a promising record of growth in both plant and reputation, Twin Coach may well be pleased with the noises it is making. • • •

WING PANELS for Grumman have accounted for large share of Twin Coach orders.



EXERCISE SNOWBIRD

BY DON MILLER

THE U. S. has no intention of building large air bases in Alaska more forward than those now in existence, Air Force Maj. Gen. George R. Acheson, who is charged with the territory's air defense, has made plain. "We do not want to build any big targets," he has said.

Viewed against this resolve, one result of last month's Exercise Snowbird takes on key significance—namely, the demonstration that paratroops in three days can build out of snow, under simulated battle conditions, a runway capable of handling jets and heavy cargo planes. Snowbird established that snow-compacted fighter strips can be built rapidly anywhere in snow country as needed, Acheson pointed out at a press session wrapping up the exercise.

"But wouldn't a jet tailblast mar the snow runway," he was asked by a reporter.

"On the contrary," the general said, "the heat would tend to solidify compaction—that is, if the jet didn't stay too long in one spot."

Principal agent in compaction is heat. In the making of a snowball, the hands provide the warmth to "compact" the snow into a missile that won't fall apart. In the making of a snow runway, prime machine used is the pulvi-mixer, a heating tiller which first pulverizes and next warms the snow grains, then drops the snow back out to refreeze into a hard runway surface.

A snow-compacted runway, it was indicated, is markedly superior to a strip cleared simply by pushing snow from terrain with a bulldozer since, under compaction, snow is pressed down to form an even surface.

• **Snowbird** marked the first time airborne troops were dropped for the purpose of building a snow-compacted runway. The paratroops who constructed the novel mile-long strip jumped in the largest paradrop (2800 jumpers) ever staged in Alaska. Equipment (300,000 lbs.) was dropped as well—all but the heaviest pieces which previous tests had shown could not be chuted down.

No critical casualties were sustained in the jumps—astonishing in view of the 1000-ft. free fall of a paratroop whose two chutes failed him.

Once on the ground, the paratroops

PARATROOPS split up (right), half to build runway, half to set up defense. Left: The pulvi-mixer.

assembled their gear, fitted on their snowshoes, and split up, with part heading off to set up and man outposts to defend the runway and its construction from "aggressor" forces. The rest turned-to on the building job, chopping down trees and putting to use the pulvi-mixer plus some 20 other machines, including timber drag, bulldozer, caterpillar tractor, road grader, snowcat, and a wobbly wheel roller.

• **Three days** after the first paradrop a C-47 landed on the strip that had been compressed from 30 inches into two feet of Alaska snow. A swirl of snow mist flared up briefly as the plane touched the runway and, after the aircraft had come smoothly to a stop, inspection of the tread passage over the pressed snow showed a barely discernible impression.

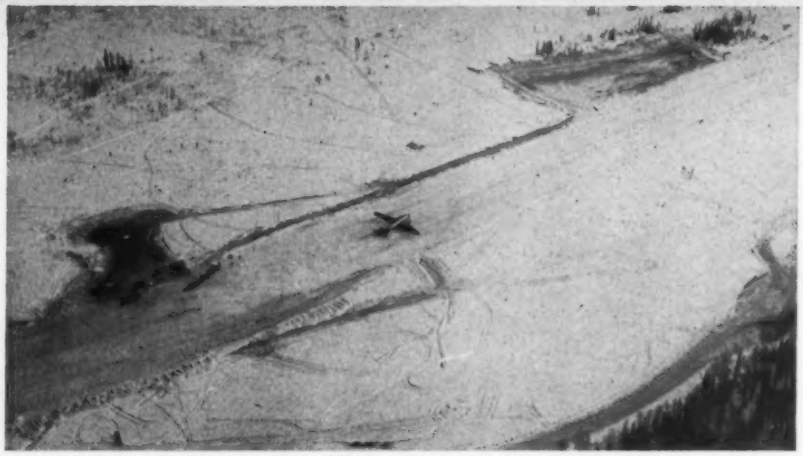
Thus Snowbird, which featured the transformation of frozen tundra into a landing field, pointed up a way both to effect greater aircraft dispersal in the event of emergency and to provide alternate bases for fighter missions. In addition, it was found that the snow-compacted runway suggested another utility. In populated areas of Alaska, ice fog can make landings hazardous. The artificial introduction into a mass of cold air of moisture from hangars, heating plants, and other installations creates an icy smog that cancels out visibility. Snowbird demonstrated the ease with which an emergency strip that would be free of ice fog could be built close by a main base.

• **Snowbird** pitted "friendly" forces (the paratroops) vs. "aggressors." Who won? Maj. Gen. James F. Collins, commanding general of the U. S. Army in Alaska who served as maneuver director, was asked this at the press windup session.

Neither side, he said. The politic general indicated the war game was terminated with the situation a draw and before the "friendly" troops or the outnumbered "aggressors" had asserted superiority.

Collins was asked was it not so that the aggressor (the Seventh Infantry Division) had moved ski-mounted 105-mm. howitzers into position to knock out the snow runway, using actual projectiles. Collins said it was up to the umpires, who will be at work for some time after the exercise evaluating on-the-spot observer reports, to rule on this point—and, the general added, the officials will have to check out as well the claim by the paratroops (the 503d Airborne Regimental Combat Team) that air strikes eliminated the artillery before it could be set up.

HEATING UNIT of the pulvi-mixer.



AFTER THREE DAYS: Successful landing by C-47

Exercise Snowbird, which had been preceded earlier last month by the flight of the 503d Combat Team from Fort Campbell, Ky. to Alaska in C-119's, had commenced with World War III pictured as under way. Both sides were assumed to be refraining from use of nuclear weapons. For purposes of the maneuver, the enemy was deemed being held in Europe along the Rhine by NATO forces, with Turkish and Greek units effecting some penetrations in the Balkan area. In Southeast Asia, the enemy was faring better, meeting less opposition, and, in Alaska, he had seized control of the territory except the Anchorage area at the central bend of the southern coastline.

• **The tactical situation** for Exercise Snowbird (which was to have been in three parts but phases one and three were canceled) had an aggressor force moving south on Anchorage, with the friendly forces staging a paradrop to the rear of the attackers, selecting a drop zone adjacent to Talkeetna, some 70 miles north of Anchorage. Purpose of the paradrop was to (1) blunt the threat to Alaska's largest city, and (2) provide the defenders with a forward air strip.

Along with Gens. Acheson and Collins, AF Lt. Gen. J. H. Atkinson, their superior and commander-in-chief Alaska, answered reporters' queries concerning both Snowbird and Alaska defense.

Did he think it likely that Russia would elect to engage in large-scale land campaigns in Alaska? Atkinson said no, but added that he did not discount the possibility of limited operations by enemy airborne troops. The Alaskan theater features deep snow in winter, miring muskeg in summer, and difficult mountain ranges to make overland troop operation difficult.

• **Atkinson made clear** that it is not U. S. intention to defend every square inch of the territory. Vital area this nation wants held is the territory's heart zone—the Seward-Anchorage-Fairbanks belt. Atkinson said that if, in a war, Russia should take an insignificant Alaskan Eskimo village close to Siberia, the U. S. would let her keep it.

The three-star general described Alaska's military importance as being its geographical location, which qualifies the area as a launching platform for offensive operations and is additionally significant because it lies astride air routes from Siberia.

New Designations for AF Guided Missiles

The Air Force has redesignated its guided missiles to describe their functions, thus eliminating the "pilotless fighter" and "pilotless bomber" categories. As a result:

• Tactical missiles become "TM's. Martin B-61 Matador is now the TM-61.

• Surface-to-air missiles become Interceptor Missiles (IM's). Boeing F-99 Bomarc is now the IM-99.

• Long-range surface-to-surface missiles become Strategic Missiles (SM's). Northrop B-62 Snark is now the SM-62; North American B-64 Navaho is now the SM-64.

• Air-to-ground missiles become Guided Air Missiles (GAM's). The Bell B-63 Rascal is now the GAM-63.

• Air-to-Air missiles become Guided Air Rockets (GAR's). The Hughes/Philco F-98 Falcon is now the GAR-1.

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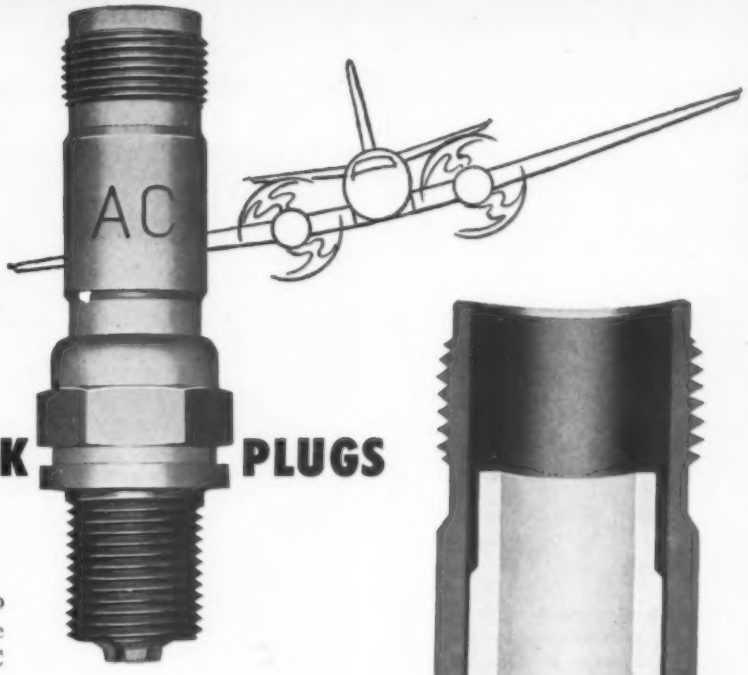

Typical of the extra performance built into all AC Spark Plugs is the record of the plug you see pictured at right. This AC model 271 plug survived 900 hours of engine time in a regular commercial airliner — two to three times the normal life of ordinary spark plugs under identical operating conditions. This is *performance* that reduces plug cost to a fraction of a cent per hour!

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MATS Simulators Give Better Training, Save $4 Million

THE LARGEST single group of multi-engine flight simulators in one installation is at West Palm Beach AFB where the Continental Div. of the Military Air Transport Association trains crews for the Air Force. There MATS has logged more than 20,000 hours simulator time on two Douglas C-124 type simulators and three Boeing C-97 units.

As MATS sees it, these simulators are now saving the USAF about $4 million annually and providing better pilot training in the bargain. Most of this saving results from the low operating cost of the multi-engine simulators —approximately $30 per hour compared with $350-$400 per hour for actual flight time in the equivalent aircraft.

Economics of this order represent the major reason for the simulator's rapid growth from an idea to a $100 million business in recent years. At the present time, according to Dr. Richard C. Dehmel, inventor of the simulator and holder of 40 patents on the device, there are 145 simulators covering 24 different aircraft models now in service. An Air Force figure puts the total number ordered to date at 174.

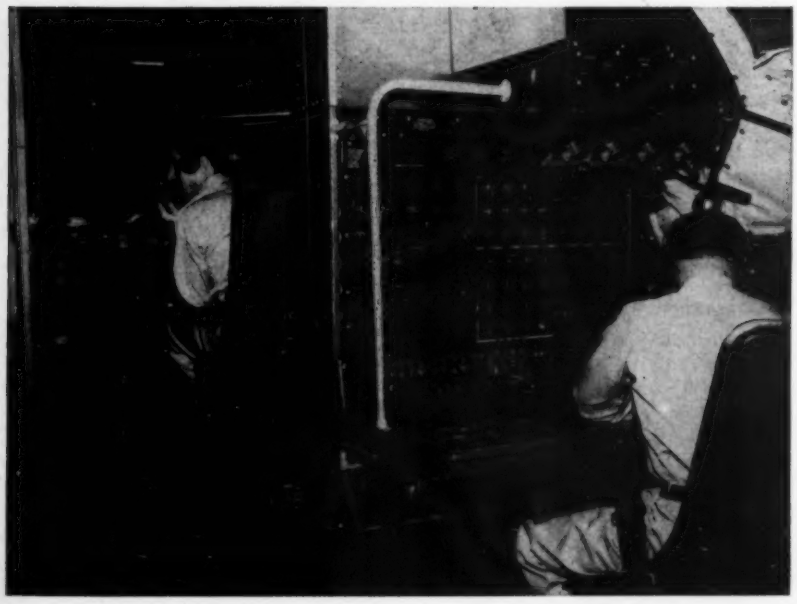
Dehmel, addressing a recent meeting of The Institute of the Aeronautical Sciences, said that the biggest problem facing the simulator now is that of keeping abreast of changes in the aircraft types which it represents. Fidelity of reproduction is one of the basic values of the simulator, yet engineering changes by the dozens keep the actual aircraft in a constant state of change. Simulators must be designed to permit ready modification to changing standards, and basic concepts regarding the importance of incorporating any given type of change must be established.

INSIDE THE COCKPIT of a C-124 simulator at West Palm Beach AFB.

Toward that end, Curtiss-Wright's Electronic Div. has made an extensive study of simulator design. The results show that components representing nearly 50% of total simulator costs (multi-engine transport simulators cost about $800,000-$1,000,000 each) can be designed to incorporate broad in-service changes in operational limits. This is accomplished by use of wide-range and capacity power supplies, computers, servos, amplifiers, and other components.

Not only does this permit field modification of the aircraft's operational characteristics, it also makes it possible to use the same basic component's on simulators for different aircraft. Curtiss-Wright is using many of the same basic parts in 12 types of simulators, ranging from twin-engine transports to 10-engine bombers.

FLIGHT ENGINEER'S PANEL behind the cockpit of a C-124 simulator.



GREMLIN MASTER: From this panel 85 troubles can be simulated.

INSTRUCTORS follow "plane's" course on chart at left. At right is approach recorder chart.

Dehmel sees a changing role for the flight simulator. Until now it has largely been a tool for transition training of pilots changing from one aircraft type to another. In the future it will be of growing importance as a means of training pilots on new aircraft types even before the prototype models are available. As such it may also serve to forewarn designers of basic aircraft characteristics, a possibility which was shown by some of the earliest flight simulator work.

To meet this new application, it will be necessary to design and produce simulators earlier. This was one of the major conclusions of the second annual simulator symposium staged by the Air Force last month and attended by some 100 industry and military representatives. "Our objective is to deliver a simulator to the user 90 days before delivery of the aircraft," says Col. Anthony J. Perna, chief of the AF's Special Training Devices Div.

Figures on the economic gains of simulators come in many forms. Dehmel, is his IAS address, said that simulator operating costs run about one-tenth that of transport aircraft per hour, while that of bomber simulators runs about one-fortieth actual aircraft costs.

Savings are not necessarily in the same proportion. MATS officials at West Palm Beach AFB are still not certain how much simulator time can be used in place of a given increment of flight time. Consequently, they are now using several different ratios of simulator-to-aircraft time, hoping that they will have conclusive data by mid-year. In these tests simulator time may be: one hour per hour of flight time; 20 hours aircraft time to 30 hours simulator time; or 15 hours aircraft time to 38 hours in the simulators.

The USAF has previously stated that use of C-97 simulators cut actual flight time requirements for transition from 40 hours to 22 hours and cited savings at $1,571,310 per simulator per year.

With the Boeing B-50, Air Force experience showed the simulator cut 15 hours off flight time and saved $6,345 per crew.

The accompanying table highlights both economic and operational facts about the simulator. During the entire period since November 1952, when MATS received its first C-97 simulator, only 138 hours and 5 minutes training time was lost due to "down-time." Average utilization ranged from 10 to 13 hours per day and the average work week was five days. Few military or civil training aircraft could parallel these records. Obviously there was no time lost due to weather.

More than 85 types of trouble can be simulated in the electronic trainer. Result is that crews get a type of training never before possible. Dehmel quoted a United Air Lines official as saying the flight simulator permitted the airline to expose the crew to more emergency procedures in eight hours than they would encounter in 20 years on the line.

OUTSIDE the C-124 simulator

At WPBAFB an interesting approach to crew training is added to the simulator program. The flight instructors who operate the simulator are the same ones who handle the same crews in actual flight. There are some 75 flight instructors, averaging 5476 hours flight time each, who handle flight training, plus 118 ground instructors who handle the 36 courses of instruction taught at the MATS training base. Thirty-five hundred of the base's 5000 personnel are involved in the training functions including maintenance of the 35 planes used. These include nine C-124's, eight C-97's, five Douglas C-118's (DC-6B's), five C-54's, and eight SA-16's (Grumman amphibian's), the latter being used in search and rescue crew training. • • •

HOW FLIGHT SIMULATORS PROVED THEMSELVES

(Palm Beach AFB)

	C-97 #1	C-97 #2	C-97 #3	C-124 #1	C-124 #2	Total
Available for training	11-14-52	3-24-53	6-30-53	8-1-53	8-2-54	
Total time power-on	11,006	8972	8370	7439	2674	38,461
Total time scheduled	6543	4644	4320	3619	859	19,985
Total time training	6863	4850	4351	3389	628	20,081
Down-time total	9:05	31:15	22:45	60:30	14:30	138:05
Average hrs. daily schedule	11	10	11	13	11	
Average days scheduled/week	5	4-6	5	5	5	
Number of crews trained	343	242	217	169	32	1003

Footnotes:
1. Line 2 represents all the time that power is applied to the simulator. The figure includes 800 to 1000 hours for plant check-out, time utilized for routine and preventive maintenance, time used for on-the-job training for Air Force and Civil Service personnel to increase their proficiency, and time utilized for training instructor and crew personnel.
2. Line 4 represents only that part of total power-on time utilized for training instructor and crew personnel, pre-flight checking of equipment, and special demonstration flights.
3. Line 5 represents the actual time lost due to maintenance in which a training mission cannot be made or completed. Scheduled time which is lost due to maintenance, which is later made up by re-scheduling, is not recorded as down-time.

C-W Service Dept.
10 January, 1955

Rothschild Nominated to Fill Murray's Post

Louis A. Rothschild, chairman of the Federal Maritime Board, has been nominated by Secretary of Commerce Sinclair Weeks to fill the post of Under Secretary of Commerce for Transportation. The hearing on his nomination is expected to come up before the Senate Interstate and Foreign Commerce Committee early in March.

Rothschild, who has filled the Maritime post since July 1953, would replace Robert B. Murray, Jr., former Under Secretary, who resigned Jan. 20.

A Kansas Republican, Rothschild has had government experience largely in connection with the shipping industry. He is also president and secretary of Rothschild & Sons, Inc., leading midwest retail company.

Rothschild's appointment is part of a shuffle whereby Ben H. Guill, former executive assistant to the Postmaster General, moved to the Maritime Board, and Rothschild replaced Murray as Under Secretary. The switch is said to have the joint support of Postmaster General Arthur Summerfield and Commerce Secretary Weeks.

New Bearing Designs and Lubricants

TURBINE ENGINE bearing and lubricant problems, steadily becoming more pressing as temperatures and speeds of rotation go up, have been under the scrutiny of the National Advisory Committee for Aeronautics. Recently NACA gave the industry a report on what it has found. Four main avenues of investigation looked as though they would repay further research:

- New materials for bearings, particularly tool steels.
- Improvements in bearing design.
- Synthetic liquid lubricants.
- Solid and gaseous lubricants.

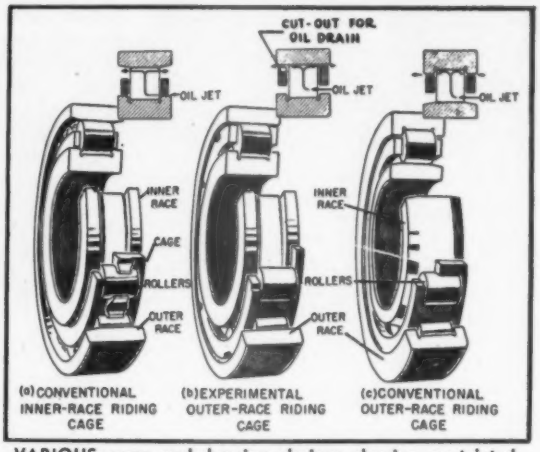
Older engines have faced temperatures from —65°F to 350°F as limits on rolling contact bearings, with maximum temperatures measured in the outer race. Newer engines will force the upper limit to 500° or 750°F. To cope with such temperatures in bearings, the material of the cages may be changed, the material of the races and rolling elements may be changed, or the overall design may be revised.

• **Bearing races of** SAE 52100 chrome steel are the current standard. An increase in temperature from 400° to 800°F is possible, NACA tests indicate, at the level of minimum hardness for heavily loaded bearings if the material is changed to a molybdenum tool steel. Drawbacks to such a change are the uncertainty in regard to fatigue life of tool steel bearings, and the greater difficulty of fabricating them.

• **Cages** are frequently subjected to inadequate lubrication, with welding of the mating surfaces as a result. In this situation, choice of materials for compatability is considered by NACA to be the most important design requirement. Following this lead, NACA discovered that wear and surface damage is held to a minimum when a surface film forms with a soft phase smeared over a hard matrix. When nodular iron is used, the film is supplied by graphite carbon coming from within the structure. Bronze becomes coated with a film of lead, and Monel is lubricated by what is believed to be an oxide.

"On the basis of wear," states NACA's Edmond Bisson and R. L. Johnson, "cast Inconel performed very well in these experiments after formation of the surface film. . .Nimonic 80 also showed promise as a possible cage material. Both of these nickel alloys have considerably better high-temperature properties than does nodular iron."

• **Bearing design** improvements contemplated by NACA center on redirecting the flow of lubricant. The experimental NACA design (illustrated above), like conventional bearings, uses a cage riding on the outer race. The innovation lies in the wider exit provided for the lubricant and the straight contour of the outer race. The less obstructed flow path reduces oil churning and friction losses, making possible better lubrication and cooling. As a result, the speed the bearing reaches at a given temperature before failure occurs is sharply increased (see graph).

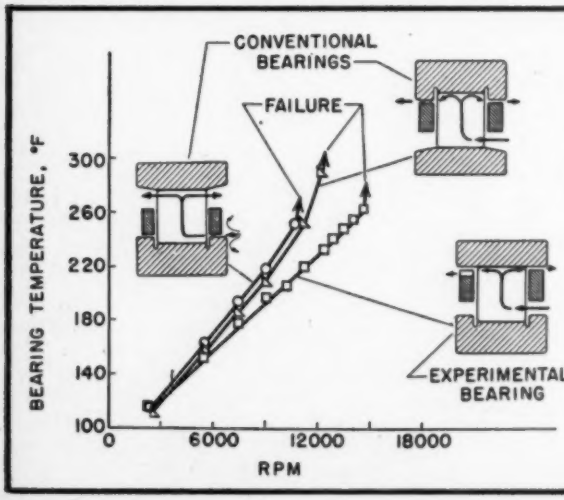


VARIOUS cage and bearing designs showing postulated oil flow patterns.

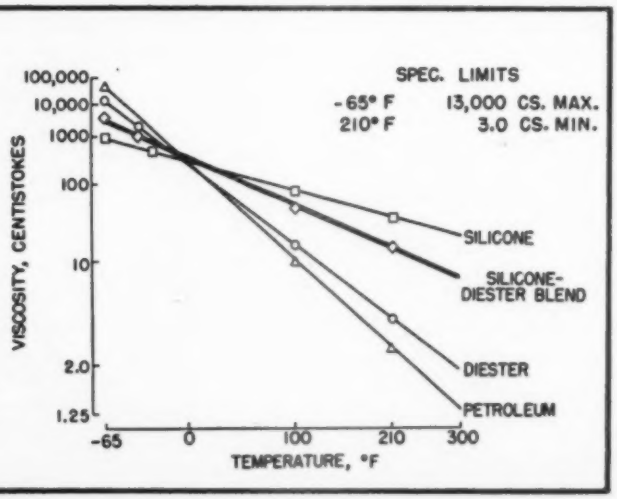
• **Synthetic liquid lubricants** promise flatter viscosity-temperature curves, i.e., lower viscosity at low temperatures, higher at high temperatures, but the silicones, which outperform diesters and petroleum by a considerable margin, are poor lubricants for ferrous alloys. NACA discovered that by adding a solvent, like a diester, to silicones, the result is a satisfactory lubricant with a gratifyingly flat curve. Performance studies are continuing.

Current and future synthetics as a class showed what NACA terms "considerable temperature advantage. . . over the current petroleums." One

Below: Temperatures and Failure Speeds of Various Bearings



Below: Viscosity Temperature Properties of Various Liquids



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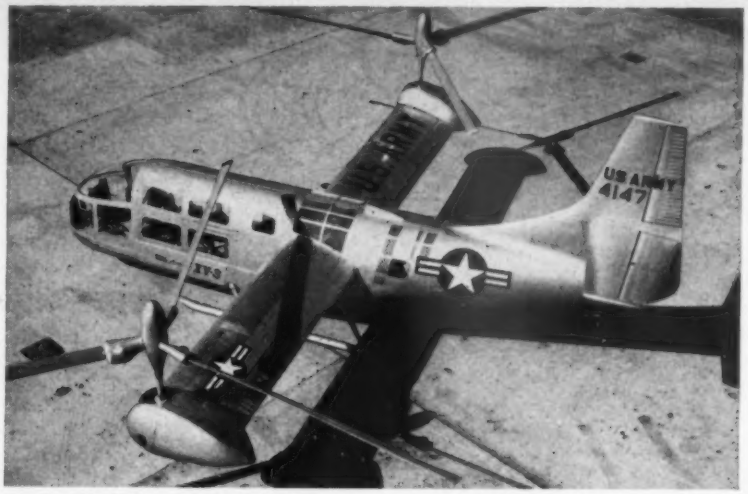
means of increasing this lead may be the relaxation of low-temperature limits on viscosity, but this requires considerable further study.

• **Solid and gaseous lubricant** studies brought out the fact that graphite or MoS_2 in an "air-mist" can produce a continuous film on rolling contact bearings, making possible operation at temperatures as high as 1000° F.

Bearings using compressed air as a fluid would have an advantage in that they could carry a greater load as temperatures rose, and would not be subject to fatigue failure. They would, however, need a high pressure air source, might become unstable in case of vibration or flutter, and would have to be carefully aligned, with small clearances. • • •



LATEST PICTURE of Bell XV-3 tilting-rotor convertiplane shows engine location in the new aircraft announced earlier this month (American Aviation, Feb. 14). It was built at Ft. Worth, Tex., under a joint AF-Army contract.

Defense Budget Near Peak In Russia

THIS YEAR RUSSIA will spend more on defense than in any other year, bar one, since the end of World War II. Significantly, Russia's largest postwar defense budget came in 1952 and was the last budget to be approved by Stalin before his death. It was for 113.8 billion rubles.

The 1955 defense budget, announced a few days before a shift in the Moscow government that put the Army and advocates of heavy industry in a stronger position, totaled 112.1 billion rubles. This compares with 109 billion rubles in 1953 and 100.3 billion rubles in 1954, the two years in which Georgi Malenkov was premier.

This year's allocations to the Ministry of Defense add up to about 12 percent more than last. No less important than the increase in the number of rubles allocated to defense is the fact that a substantial decline in Russian price levels during the past year has considerably enhanced the purchasing power of the ruble, which means the Russians will get more defense per ruble than in the past.

An even larger increase in money was granted to heavy industry, which went from 133.2 billion rubles in 1954 to 163.3 billion rubles in 1955, an increase of 23 percent. The heavy industry budget in Russia includes many items normally classed as defense in the U. S., such as increased spending to boost aluminum and steel output.

Russian spending for nuclear weapons is hidden in that portion of the Russian budget allocated to the "national economy," the total for which comes to 200 billion rubles in 1955.

Though direct comparisons have no practical validity, if the artificial exchange ratio of four rubles to the dollar is used, the Russian allocation to the Ministry of Defense comes to about $28 billion, compared to the recent Eisenhower Department of Defense spending proposal for fiscal 1956 of about $34 billion.

AF, Navy Disagree On Profit Sharing

THE AIR FORCE and Army on one hand, and the Navy on the other, are split on whether to allow as cost items profit-sharing payments made to their executives by aircraft companies.

In a recent memorandum to Air Materiel Command, Assistant AF secretary Roger Lewis declared flatly: "It is the view of this office, which has been discussed with the Secretary and Under Secretary and coordinated with the procurement secretaries of Defense, Army, and Navy, that payments under management incentive plans are not proper costs under Defense Department contracts."

But in an explanation of the Navy's position on the subject, it was stated that, "The Navy representatives see no reason for departing from the basic principle (spelled out and restricted in Part 6, Section XV, Armed Services Procurement Regulations) that costs of profit-sharing retirement plans . . . are allowable." It was also pointed out that while the Navy's comments apply specifically to profit-sharing retirement plans, "they also apply in principle to profit-sharing plans in general and stock bonus plans."

The situation has now become so controversial that Defense Secretary Charles E. Wilson may have to make the final decision. On top of that, however, the General Accounting Office is reported "highly concerned" about the expense of some aircraft firms' "fancy retirement and incentive benefit plans," and GAO may have the final legal word regardless of what action the Pentagon ultimately takes.

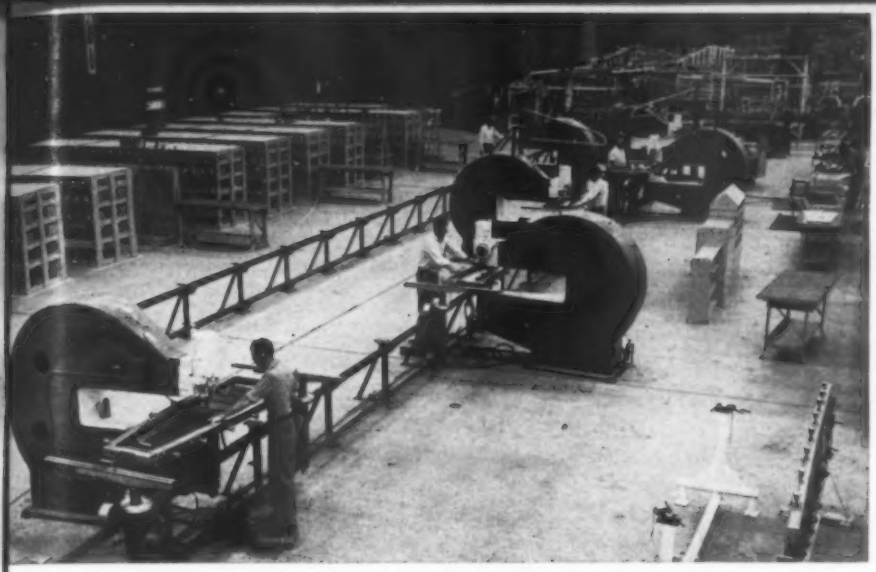
All the services are presenting their views on the subject to the Armed Services Procurement Committee, which is writing a new set of cost allowance principles (Part 2, Section XV, ASPR). After they are written they will be submitted to industry for comment. The Aircraft Industries Association, while interested in the outcome, will take no official position in the controversy, it is reported.

Among the aviation companies which have retirement plans partially supported by profits are Boeing, Curtiss-Wright, North American Aviation, and Fairchild. Lockheed has begun a similar program for which USAF has denied approval. • • •

Race Prizes Total $2,000

Total of $2,000 in prize money will be awarded to winners of the Ninth Annual All-Woman Transcontinental Air Race to be run July 2 to 6 from Long Beach, Calif. to Springfield, Mass. First place winner will receive $800; second, $500; third, $400; fourth, $200, and fifth $100.

The 2800-mile handicap race is open to stock-model aircraft with 300 hp or less. Inquiries should be directed to Mrs. Barbara E. London, 624 Armando Drive, Long Beach 7, Calif.



General view of Convair's automatic riveting arrangement.

Speed, Economy, Precision

Bonuses from Automatic Riveting

THE PRECISION manufacturing needed for the assembly of Convair's supersonic B-58 bomber has spurred development of a new riveting system which promises to cut costs and improve quality. Preliminary results indicate that reductions of more than 50% in working time may result.

In B-58 construction Convair faced the problem of holding perimeter ordinates of many riveted assemblies to ± 0.004". To meet these unprecedented requirements, the company evolved a four-part system involving specially designed clamps and aluminum frames to hold the parts, vertical tracks along which carriages move the frames from one work position to another, and automatic riveting machines.

Two of the vertical tracks, each 115 feet long, were set up parallel to each other. A hoist loads an aluminum "picture frame" fixture onto one track at one end. When set in place on its wheeled carriage, the frame moves on the track through the detail stock bin area, where detail parts are clamped in position. The unit then moves on to an automatic riveter, where angle stiffeners are riveted to the webs.

At this point the work moves from one track to the other, by means of a transfer gate. After passing five more automatic riveting machines and two pneumatic squeezers, the work moves into the clean-up area. Here, in places not accessible to the automatic machines, rivets are inserted by hand. Inspection comes next, at the end of the track. The part is then removed from the frame and stored on racks while the carriage and frame return to the spot where the cycle began. The frame is returned to its storage location and a new one is placed on the empty carriage.

Time savings with this technique are reflected in the following figures:

	Conventional Method (hours)	Automatic Method (hours)
Loading detail parts onto fixture	.20	.20
Riveting webs to stiffeners	1.20	.67
Riveting webs & stiffeners to chords	.50	.18
Riveting webs to chords	1.18	.42
Cleanup	1.00	1.00
Totals	4.08	2.47

"As production progresses," says tool engineer Clinton A. Bay of Convair-Ft. Worth, "it is anticipated that familiarization, operational skills, and fabrication techniques will reduce fabrication time at least 25 percent."

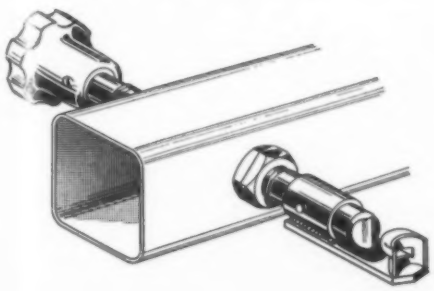
The smallest item in the program, the clamp, was the biggest problem. No suitable unit was available on the market, but the Siewek Tool Co. of Detroit offered to try to meet Convair's requirements. The clamp must be made of standard parts and include the following features:

- **It must combine** clamp and locater, minimize obstruction of working area, and assure accuracy of position.
- **It must be mounted** through the frame structure, rather than above or below it, to give better machine throat clearance, rigidity, and economy.
- **It must have** hook and locator units (see drawing) interchangeable.

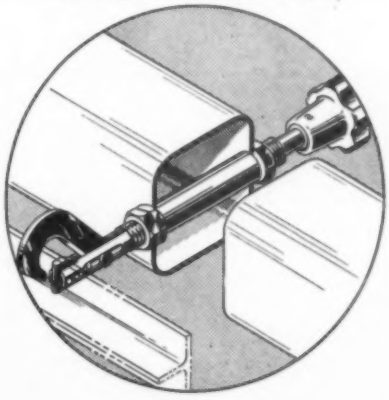
Three designs failed, but the fourth model satisfied all requirements. Initial cost is comparable to that of conventional clamps, but savings result from the added durability and re-use possibilities.

The carriages which carry the work frames along the tracks consist of two horizontal arms, cantilevered out from the upper track. The work, clamped inside the frame, may be rolled along these horizontal arms for positioning at the riveting machine. The carriages and

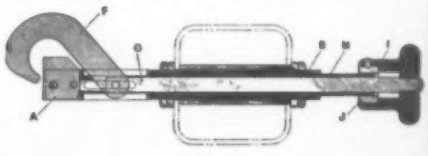
SIEWEK CLAMP with holder and locator adaptions for use on spar cap channel sections.



THE CLAMP with adaptions for use with angle or tee-type sections.



Pre-set positioner (A) is secured to tubular holder which is threaded (B) to allow adjustment "in and out." Hook (F) is pulled down against positioner by tie rod (G) which is secured by handle (I). Internal threads (J) provide clamping pressure. Undercut holder (H) permits quick travel for clearing or positioning hook.



ABOVE: Ease of handling material is demonstrated. Below: Finger-tip pressure positions material. Riveter is operated by foot pedals.

tracks are a necessity since the work and frames would be too heavy to move from one machine to another manually.

On the other hand, if all the work were done at one machine, eliminating the need for movement, too much time would be lost in changing the setting of the machine from one size rivet to another. Even though automatic riveting is roughly 11 times faster than handwork, the advantage is lost if a number of set-up changes must be made.

The lightweight, adjustable carriages allow use of several machines, each set up for a different rivet size. The vertical tracks take up a minimum of floor space, can be easily adapted to a variety of layouts, and are economical to construct and install.

Onto the carriages go the frames. These were made necessary by the fact that the only way to maintain required dimensions was to keep the detail parts clamped in position throughout the complete assembly process. Preliminary trials showed that conventional fixtures wouldn't do the job accurately enough, and Convair turned to the problem of developing one which would.

What was needed was a fixture which would:

- Locate and secure all parts accurately throughout assembly;
- Provide stops and other positioning devices that could be set to an accuracy of $\pm$ 0.002".
- Move readily from machine to machine.
- Offer ready access to all working areas.
- Cost little to fabricate.
- Occupy only a small work area.
- Be made from a basic sketch, rather than from individual designs.
- Incorporate details that could later be re-used.
- Adapt to automatic, semi-automatic, or manual riveting.

The "picture frame" fixture, which has long been common in the industry, was chosen as the result of a series of comparisons (see table). By using aluminum instead of steel, the weight of a typical fixture was reduced from 185 lbs. to 70. This made it possible to store the frames in stacks or on racks, resulting in a 75% saving in manufacturing floor space.

Since present contracts involve automatic or semi-automatic riveting for 70% of the fasteners, the prospects of 50% savings in man-hours would make the new technique a promising one from that aspect alone. Fifteen thousand man-hours were used to put 3.2 million fasteners into the B-36 bomber.

But more than manufacturing economies are involved. Development of some such approach is more a necessity than a convenience. Says tool engineer Bay: "Close tolerances are no longer adequate. Precision has become the 'watch-word' in the fabrication of supersonic aircraft." • • •

Why the Aluminum "Picture Frame"

Convair's comparisons of various methods had these results:

Type of Fixture	Fabrication Costs	Material Costs	Weight	Accuracy
Table Top	151 hrs.	$295	370 lbs.	±.015
"A" Frame	187 hrs.	$310	350 lbs.	±.015
Plate Masonite*	64 hrs.	$115	140 lbs.	±.009
Picture Frame (Steel)	115 hrs.	$420	185 lbs.	±.004
Picture Frame (Aluminum)	**81 hrs.**	**$434**	**70 lbs.**	**±.002**

* This is basically a sheet of masonite with cut-outs for the rivet pattern and stop-blocks for locators. Clamps were springs which held parts against the locator blocks. These fixtures are very accurate and economical, but require an excessive amount of time to set up and load. Accuracy diminishes with continued usage.

British Industry Set Sights Too High—Petter

SOUTHAMPTON—Winding up the conference organized by Britain's Institution of Production Engineers, W. E. W. Petter, managing director of Folland Aircraft Ltd. and designer both of the Canberra (B-57) and the Gnat light fighter, emphasized the need to canalize technical personnel and facilities in order to design fewer but more practical articles.

"The specification writers since the war have tended to set their sights much too high . . . and no doubt the aircraft industry must take a grave responsibility for being too ready in its promises," said Petter. British technicians "underestimated the difficulties of supersonic flight, the time scale of new radar sets, the time to develop new weapons."

• **Industrially,** overcommitment was the trouble—too many channels and too little water. Twice as many large airplanes, civil and military, have been attempted as the UK has the technological capacity for, in addition to other types.

Management seeks a steady expansion of commitments, more and more prototypes to insure plenty of production work—allowing for failures. "This," says Petter "is the dance of death for the designers." One new aircraft every six years is all a designer and his team can tackle with real success.

• **By handing out rewards** or "pains" the Ministry of Supply can control industry, while acting as an efficient bridge between the maker and the customer. If the customer (RAF) aims seven years ahead in requirement, taking airframe, equipment, and engine, success chance is barely one-in-eight with a possible time stretch to 10 years. With a four/five year target, the success ratio improves to 1:2.

In Petter's view neither nationalization nor rationalization offers any hope whatsoever of solving the present delays.

• **Petter further expressed** the opinion that enlarging teams is not an answer, as he thought the optimum design group for one airplane was 200 or less. Technical manpower is short, but it is increased quality rather than quantity that is wanted.

The conference, which was attended by some three hundred technicians, including most of the senior design and production engineers from airplane companies in the south, west, and midlands, was on the theme, "Integral Construction Contrasted with Traditional Methods." •

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1/4/55

JLH:

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It might give comfort to the communists to tell them anything at all about our missile work.

The equipment Raytheon is producing for the security and defense of the country is so ~~important~~ vital that we can't afford to take any risks.

It seems to me there is a message we should print, however—one in which every American can take pride and confidence: Raytheon's government contracts are being carried out by many of the nation's ablest scientists, engineers and workers. These fine people have a deep respect for the quality of the electronic equipment they make. They know its importance to the welfare and safety of a free people. What do you think?

Jack -
This is a matter of policy -
- Please see me -

C. F. Adams, Jr.

RAYTHEON MANUFACTURING COMPANY, WALTHAM 54, MASS.


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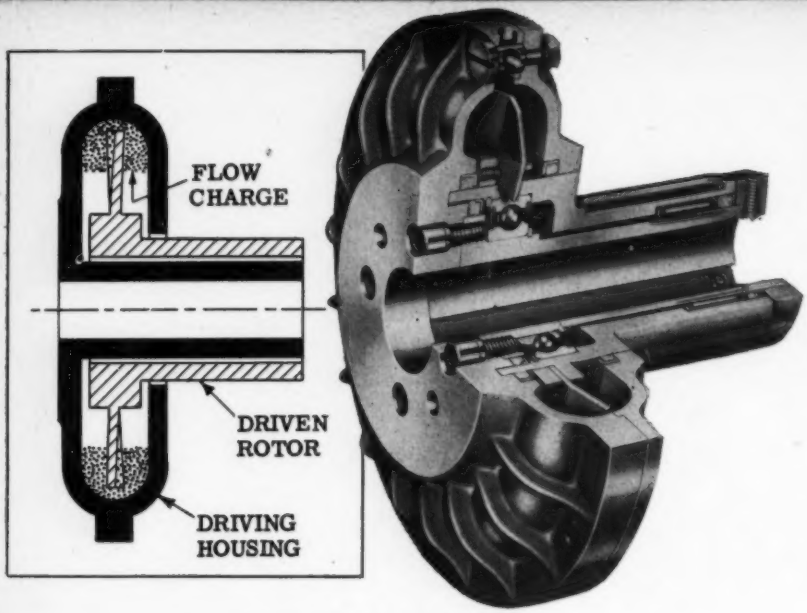


Diagram and cutaway of Dodge drive.

Piasecki Studies New Dry Fluid Drive

New dry fluid drive unveiled recently by Dodge Manufacturing Corp. and reportedly being studied by Piasecki Helicopter Corp. for helicopter use features no-slip performance at normal operating speeds.

Called the Flexidyne, the Dodge development uses a flow-charge of .011" diameter chrome steel shot of the type used in shot-peening operations. As the charge is thrown to the circumference of the housing under starting conditions, friction created against a wavy steel rotor plate starts it turning and transmits power to the driven unit.

Once the rotor and housing reach identical speeds, the charge is "packed" against the outer housing resulting in virtually a solid drive between the motor and load. • • •

Kaman's New Lightweight Clutch

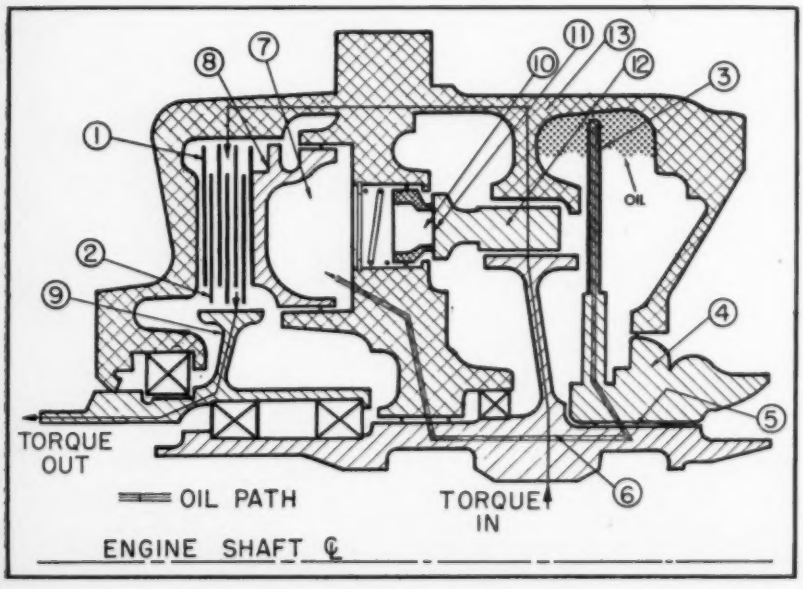
A SIMPLE, lightweight helicopter clutch has been developed by the Kaman Aircraft Corp. The design features a torque-sensing valve which automatically disengages the clutch if the engine stops and autorotation begins.

The device, the Kaman Hydra-Mechanical Clutch, weighs 76 lbs. when designed to transmit 600 hp at 2250 rpm (1.29 lbs./hp). By adding an additional element weighing a little more than three lbs., capacity can be increased to 800 hp at the same speed (0.98 lbs./hp). Kaman estimates that 40% of this weight may be pared off by refining the design.

Power is transmitted through a double series of disks (1 & 2 in the cross-section of half the clutch shown below). The outer series of disks is splined to the rotating outer casting (13), the inner series to the shaft through which power is taken out (9). As the engine picks up speed, oil is thrown by centrifugal force to the outside wall of the rotating housing. It there enters the scoop tube (3), which is stationary, and is conducted to the "power annulus" (7), the area behind the piston (8). The oil under pressure forces the piston forward, pressing the clutch disks together. The torque from the outer housing is then transmitted to the output shaft by means of teeth on the edges of the disks.

If the engine stops, the oil pressure which has kept the torque ring (12) pressed tightly against the torque valve (10) is reduced. The ring moves backward, leaving the valve open, and oil is dumped out of the power annulus. The piston stops pressing against the disks and the rotor is free to autorotate.

Disks in the prototype have been used over 300 hours with less than 0.001" wear. Kaman estimates that a 600-hour operating interval can be operated. • • •



KAMAN CLUTCH cross section (left): 1-2—Wet disks; 3—Scoop tube; 4—Fixed aft hub; 5—Roller transfer bearing; 6—Rotating hub of clutch; 7—Power annulus; 8—Piston; 9—Output shaft; 10—Torque valve; 11—Torque valve seat; 12—Torque ring; 13—Rotating outer housing.

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★**H. H. Stevens,** TWA. Supv.-radio operations, Kansas City.

West Coast Talk . . . By Fred S. Hunter

- **No, not single-tailed Connies!**
- **The Millers keep coming at Northrop**
- **Learning costs will be steep with commercial jets**

NOW LOOK-A HERE, Kelly Johnson, what's all this talk about switching over to a conventional single tail on the turboprop Super Constellation? Don't do it, Kelly, don't do it! It just wouldn't be a Super Constellation without the triple tail.

* *

OUT AT NORTHROP, it's the Millers, not the Campbells, who keep coming. There's Robert R. Miller, who is vice president and executive assistant to the president; C. Harte Miller, who is assistant to vice president John W. Myers; D. L. Miller, who is chief of off-site manufacturers; and now Gil Nettleton has added Mark R. Miller, who used to peddle 340's for Convair, to the military relations department. And not even a distant relative in the bunch.

* *

IF YOU ARE a little broad of beam in the aft section (Who, us?) it may interest you to know that TWA is installing wider seats in its new Model 1049 Super-G Constellations. They're 51½-inch TECO doubles, which net 1½ inches more in each individual chair for you to bulge out in.

* *

LOS ANGELES Airport commissioner Harry Dow knows now that unless your humor is broad enough to be understood by one and all you had better play it straight when presiding at community meetings, particularly if you are laying the ground work for a future airport bond issue. After a few questions from the floor on what happened to FIDO, Harry decided it would be a good idea to kiss it off with a humorous observation about trying to sell it back to the British. Next day the London Times correspondent was around asking for details of the sale.

* *

HERE'S A POINT on jet transport costs interjected by Ray Kelly, superintendent of technical development for United Air Lines. Airlines also have to take learning curves into account in calculating operating costs on new equipment they may order. That's why figures prepared by the carriers themselves invariably come out higher than the figures the manufacturers prepare on operating costs. The airfline learning cost ratio on jets might be fairly steep.

* *

DID YOU KNOW that the Army now operates 41 airfields? . . . JIM READ, who retired as deputy regional administrator of the 4th Region after rounding out 25 years of CAA service, had as many friends in aviation, probably, as anyone in the industry and will be widely missed . . . LOCKHEED Air Terminal, which previously installed some $15,000 worth of fire lines and hydrants along both of its runways, now has added a new $38,000 four-wheel drive combination foam and water pumper of the latest design.

* *

CALIFORNIA Aeronautics Commission may be in for tougher sledding at this year's legislative session. It seems to have lost some friends. The California Association of Airport Executives recently voted to recommend it be abolished. Trouble is over unrefunded gas taxes, which now are remitted to the various airports, but are mighty tempting as a source of income for a state agency.

* *

MAKE YOUR reservations early. Four of the remaining five paid holidays in 1955 combine with Saturdays and Sundays for long weekends. Memorial day is Monday, May 30; Independence day, Monday, July 4; Labor day, Monday, Sept. 5; and Christmas, Sunday, Dec. 25 (substitute holiday, Monday, Dec. 26). We offer this important intelligence in the face of knowledge that we expose ourselves to innumerable wisecracks about every weekend being a long weekend for us.

NEW CURTISS-WRIGHT DEVELOPMENTS ANNOUNCED

Major entry by Curtiss-Wright Corp. into the fields of reinforced plastics, electronics, and ultrasonics was launched recently by announcement of these developments:

• **High Temperature Plastics**—New glass-reinforced plastic said to retain its rigidity and strength at temperatures up to 500°F are reportedly being evaluated for use in compressor blades of advanced jet engine designs. Many potential applications, C-W says, include other jet parts, missile radomes, antenna housings, and structural parts subjected to aerodynamic heating and ducting of hot gases.

• **Diatron Drill**—A non-rotating drill that uses ultrasound cuts virtually any shaped hole in metal or ceramics within tolerances of .0001". The Diatron drives a fluid abrasive mixture into the piece being worked and requires no finishing or polishing after drilling.

• **Ultrasonic Washers**—New units for cleaning and degreasing large and small metal parts develop from 400 to 10,000 watts of sound energy in a series of eight models announced. The company is planning development of large models for aircraft engine parts cleaning for use in its Wright Aeronautical Division.

• **Echoscope**—New ultrasonic inspection device for detection of internal flaws in metal operates on an impulse-echo principle and presents inspection results on a scope. A single unit serves as both transducer and receiver, and the device is said to be particularly adapted to inspection of large and bulky pieces.

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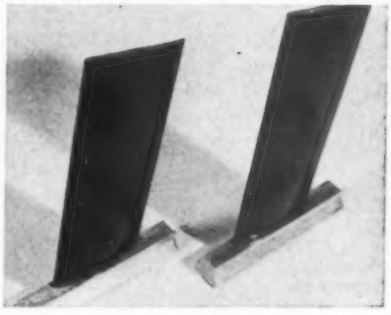
Echoscope



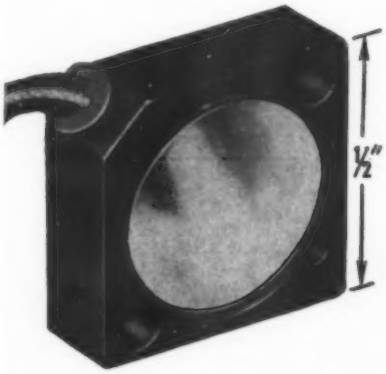
Plastic Jet Blades

Diatron Drill

Ultrasonic Washer

Potentiometer

Tiny Trim, a new aircraft-missile-electronic trimming potentiometer, weighs less than two grams and measures 1/2" x 1/2" x 3/16". A development of Daystrom Pacific Corp., it is furnished in standard resistances of 10,000-25,000 ohms.



Stability of the new unit extends throughout the AN range and above to 250°F.

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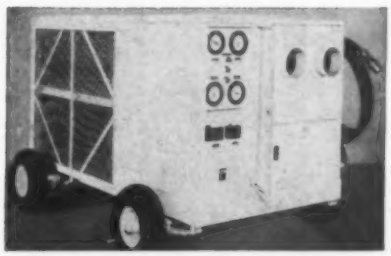
Air Conditioner

A new portable ground air conditioner for cooling aircraft and aircraft electronic equipment has been placed on the market by Electroflow, Inc., Div. of American Electronics Inc. The model pictured here has a capacity of 80 lbs. per minute at 3 psig and 45° F and meets this capacity in ambient conditions up to 120°F dry bulb and 75°F wet bulb.

Included in the design is a York 6-cylinder compressor and a rotary positive Roots-type blower. Three 25-foot ducts are furnished with storage space in the unit, and the entire main airflow system is insulated with fiber glass to minimize overall sound level.



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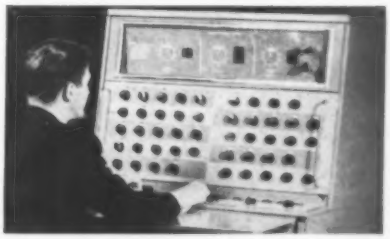
Computer

A specialized analog computer designed for operation and use by aircraft design groups has been announced by Link Aviation, Inc. It provides that all inputs are in a form familiar to the aeronautical engineer. Thus dispensing with the need for specialists to interpret, scale, and schedule computations.



The Link Aerolog Computer calculates steady state rates of climb, maximum speeds, lift coefficients, and climb angles of any airplane. It can be changed over from one problem to another involving a different airplane, then back to the original in a matter of minutes.

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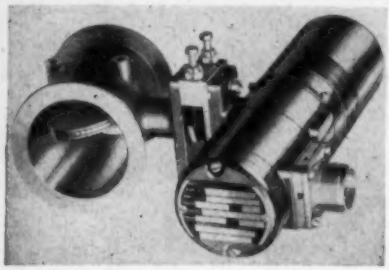
Valve Castings

Potential weight and cost savings through the use of investment-casting processes for precision parts production are demonstrated by Misco Precision Casting Co. in a 2-inch aircraft air valve body and disc produced for Barber-Colman Co.

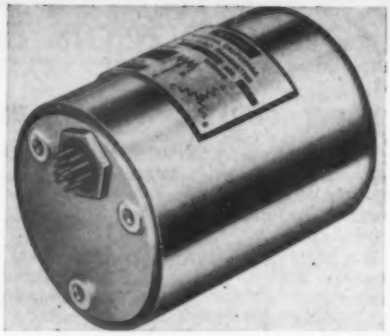


The investment-cast parts range in size from 1½" to 2½", are produced from 347 stainless steel, and are 100% x-rayed.

Circle No. 74 on Reader Service Card.

Rate Gyro

A new high-performance-rate gyro developed by G. M. Giannini & Co., Inc. for aircraft, missile, and telemetering installations weighs less than 1.5 lbs. and measures 2" in diameter by 2.68" long. Its rotor develops an angular momentum 1,500,000 gm cm²/sec. (inertia ratio of 0.006 seconds) and is said to provide an unusually high degree of sensitivity for a gyro of its size.



The Model 36128 gyro is hermetically sealed in an oil-filled case and is maintained at a uniform temperature by means of internal thermostatically controlled heating elements. A wide variety of rates, resistance ranges, damping ratios, and three-phase 400-cycle a-c rotors is available.

Circle No. 60 on Reader Service Card.

Waveguide

The Type ARA-136 flexible waveguide produced by Airton, Inc. is adapted for use with either C-Band or X-Band commercial airborne weather radar. Of brass tubing and flange construction, the new design may be jacketed with either synthetic rubber or vinyl plastic to suit particular applications.

Tubing interior is silver plated for peak electrical performance. At 5400 megacycles (C-Band), maximum VSWR is 1.08, attenuation 0.10 db/ft., and power capacity 500 kw. Corresponding ratings for 9300 mc (X-Band) are 1:10, 0.10 db/ft. and 400 kw.

Circle No. 75 on Reader Service Card.

Maintenance Car

Longren Aircraft Co. is now demonstrating the prototype of a new multi-purpose aircraft maintenance vehicle special designed for service at Arctic military airbases. It furnishes pneumatic, hydraulic, and electrical power for servicing and starting fighter and interceptor aircraft.

The AMS-Model 5 unit is a joint development of Longren and Aircraft Maintenance Systems, Inc. It carries all power transmission hoses and cables on reels at the aft end of the vehicle,

Fly into *Action*

Many a successful man works hard at being successful... only to find he has no time for what success is supposed to bring: The thrill of going places; the enjoyment of friends, of sports, of pleasure, of weekend relaxation.

But for thousands of men, ownership of a fast Beechcraft has enabled them to "FLY into action"... has provided them a new and faster means of business travel... has provided too a new and better way of living!

Men of decision have *more* time for work – *more* time for pleasure, too. They reduce travel time as much as 75 per cent. They visit distant plants and customers more often and still have time for important home office activities. Their Beechcrafts are the Air Fleet of American Business.

Beechcraft

Beech Aircraft Corporation
Wichita, Kansas, U. S. A.

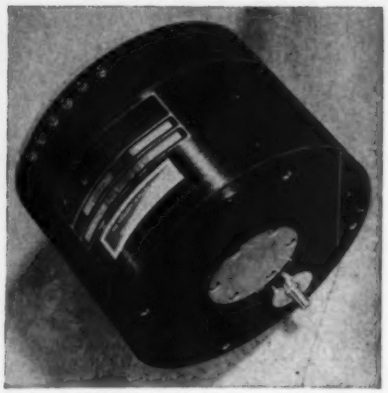
BEECHCRAFTS ARE THE AIR FLEET OF AMERICAN BUSINESS

and towing lugs are incorporated for supplementary service in moving aircraft.

Circle No. 64 on Reader Service Card.

Potentiometer

A new dual cosine potentiometer reported to have an accuracy of four parts in 10,000 has been introduced by Gyromechanisms, Inc. It consists of two electrically isolated potentiometers



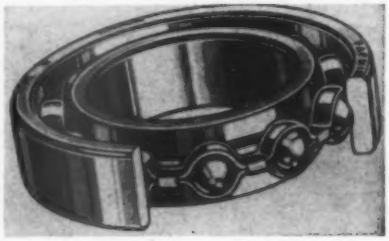
driven from the same shaft, weighs 4.2 lbs., and is hermetically sealed in nitrogen atmosphere in a case of anodized aluminum.

Dimensions of the unit are 5.156" long by 5.565" diameter. Proposed applications include computers, servo mechanisms, and telemetering equipment.

Circle No. 62 on Reader Service Card.

Bearings

New light-section, large-bore bearings introduced by The Fafnir Bearing Co. for use in jet engine gear boxes, helicopter gear boxes, and accessory drives are designed for areas where space and weight are at a premium.



The M9300K series bearings are rated for light to moderate radial loads and moderate thrust loads in either direction. Literature available.

Circle No. 63 on Reader Service Card.

Oxygen Regulator

A 100% saving in cockpit panel space is featured in the new Scott-Firewel miniature oxygen regulator in-

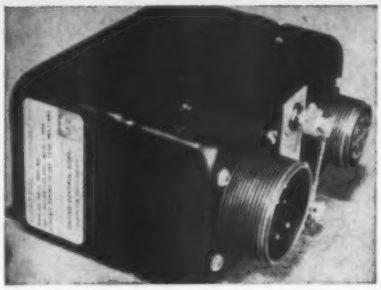
troduced by Scott Aviation Corp. It weighs 1¾ oz. compared with 4¾ lbs. for a standard Air Force regulator, and attaches directly to a standard A-13 crew oxygen mask.

Circle No. 76 on Reader Service Card.

Temperature Regulator

A new transistorized two-channel regulator has been developed by United Control Corp. for aircraft Nesa-glass, anti-icing, and duct-temperature control. Weighing 2.5 lbs., the dual unit houses about 65 subminiature units in a control package that measures 3" x 4" x 5".

Two hermetically sealed amplifier and associated bridge networks enable the unit to withstand environmental



conditions associated with the most advanced aircraft, the manufacturer states. Maximum operating power for both channels is six voltamperes at 400 cycles compared with 20 va for a dual control using vacuum tubes.

Circle No. 77 on Reader Service Card.

Vacuum Relay

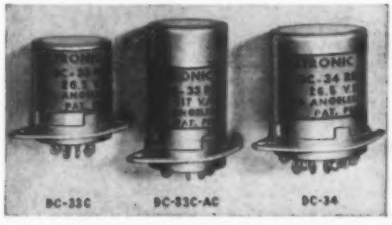
The Model R5-E high voltage vacuum relay developed by Jennings Radio Mfg. Corp. for guided missile applications is only 3″ long and 2″ in diameter. Break time is about 10 milliseconds and make time about 25 ms.

Vacuum dielectric that provides 30 times the dielectric strength of air makes possible the design of a compact 10 kv relay, the manufacturer says. Actuation is accomplished by either a 12- or 24-volt d-c solenoid in the relay base.

Circle No. 65 on Reader Service Card.

Sealed Relays

A new series of miniaturized relays developed by Deltronic Corp. range in weight from 2.5 oz. to 4 oz. and are designed to meet or exceed requirements of Spec. MIL-R-5757B.



New relays include: Type DC-34—a 4 PDT unit featuring a non-energized armature locking device; Type DC-33C—a DPDT snap action contact type; and, Type DC-33C-AC—also a DPDT unit with coil rating at 117 volts a-c. All models are said to function without chatter under shock loads exceeding 100 g's for 11 milliseconds.

Circle No. 78 on Reader Service Card.

Flasher Unit

CAA TSO approval has been granted for the Blink-R navigation light flasher—a 13-oz. unit marketed by Van Dusen Aircraft Supplies and used on military helicopters, liaison aircraft, and executive aircraft.

The Blink-R produces 60 to 100 flashes per minute, is fully shielded,

and contains a radio interference filter. In event of flashing system failure the lights assume a "steady-on" condition.

Circle No. 79 on Reader Service Card.

TECHNICAL LITERATURE

TITANIUM FORMING. New facilities literature available from Wayne Foundry & Stamping Co. emphasize its progress in forming commercially pure titanium aircraft parts. Included are 17-page general facilities booklet and 7-page titanium report.
Circle No. 85 on Reader Service Card.

APPROACH RADAR. New SPAR (Super Precision Approach Radar) developed by Laboratory for Electronics is illustrated in 6-page folder.
Circle No. 86 on Reader Service Card.

DATA REDUCTION. The Vic-Dar principle of data reduction is presented in a 4-page catalog by Victor Adding Machine Co.
Circle No. 87 on Reader Service Card.

EXECUTIVE AIRCRAFT. Aero Design & Engineering Co. has released a 12-page brochure describing the new Model 560 Aero Commander.
Circle No. 88 on Reader Service Card.

BUYING GUIDE. A 16-page catalog of extruded and molded rubber and extruded plastics compounds is available from The General Tire & Rubber Co.
Circle No. 89 on Reader Service Card.

METAL HOSE. Flexonics Corp. describes its Flexon bellows and flexible metal hose in new 16-page catalog.
Circle No. 90 on Reader Service Card.

ELECTRIC MOTORS. Catalog EI-3A issued by Electric Indicator Co. contains a 26-page listing of available induction and torque motors.
Circle No. 91 on Reader Service Card.

PACKAGING GUIDE. "How to Pack It" is the title of a 30-page catalog published by Hinde & Dauch.
Circle No. 92 on Reader Service Card.

SAFETY EQUIPMENT. Complete line of combustible gas analyzers and alarms are described in 20-page booklet by Mine Safety Appliances Co.
Circle No. 93 on Reader Service Card.

ENGINEERING HANDBOOK. An 82-page manual on rubber seals and gaskets has been published by Minnesota Rubber & Gasket Co.
Circle No. 94 on Reader Service Card.

PLASTIC CLOSURES. File folder and samples of new CaPlugs plastic closures is being distributed by Protective Closures Co., Inc.
Circle No. 95 on Reader Service Card.

STRUCTURAL BONDING. Marbond, The Glenn L. Martin Co. trade name for its honeycomb core, sandwich material and adhesive development, is fully illustrated in a new 34-page brochure.
Circle No. 96 on Reader Service Card.

MOBILE DIRECTION FINDER. Servo Corporation of America illustrates its new DFM-2 mobile direction finder and DFG-2 automatic HF direction finder in two new 4-page booklets.
Circle No. 97 on Reader Service Card.

6TH

On April 25th, American Aviation's editors will present their sixth annual summary of the operations, airborne and ground equipment, engineering and maintenance of the three huge air transport systems: the world's airlines, the corporation aircraft fleets, the military "airlift."

ANNUAL AIR TRANSPORT PROGRESS ISSUE APRIL 25, 1955

1955 WILL BE THE BIGGEST YEAR YET IN TRANSPORT HISTORY—A YEAR OF CONTINUED GROWTH AND EXPANSION—A YEAR OF MORE NEW EQUIPMENT TAKING TO THE AIR!

The multi-billion dollar air transport industry never stops growing, and the annual issue American Aviation devotes to a complete summary of its operations has become accepted as the authoritative reference on the subject. Once again, it will be the only magazine officially designated to carry the Air Transport Association's vital, factual, yearly report.

American Aviation's annual Air Transport Progress Issue is looked forward to and read by all important aviation men. With circulation at an all-time high, more than 45,000 copies will carry your advertising message to the customers you want to keep and the ones you want to get!

ADVERTISING DEADLINE **APRIL 4, 1955**

American Aviation Publications

Editorial Offices: 1026 Vermont Avenue, N. W., Washington 5, D. C.
Advertising Offices: LaGuardia Airport, New York City

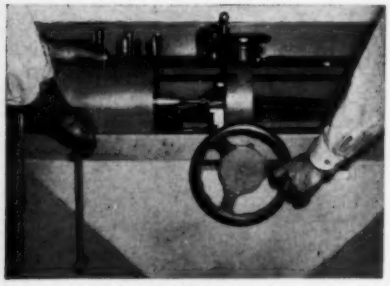
Maintenance Bulletin Board

New time-saving devices developed by Braniff Airways' shop personnel are credited with cutting costs up to $77,000 a month, according to maintenance and overhaul director J. R. Horton. Some of the more significant contributions include:

• **Electrical Tester**—Designed by foreman Sam Holt, this device checks out the 75 electrical connections in a DC-6 or Convair 340 engine installation in five minutes. If a discrepancy exists, tests buzzers and warning lights fail to operate, giving the mechanic an immediate indication of improper hook-up.

• **Flexible Hose Cutter**—A joint effort of foreman Holt and mechanic Guy Alldredge is a combination cutter and assembly/disassembly machine for handling Aeroquip flexible hose.

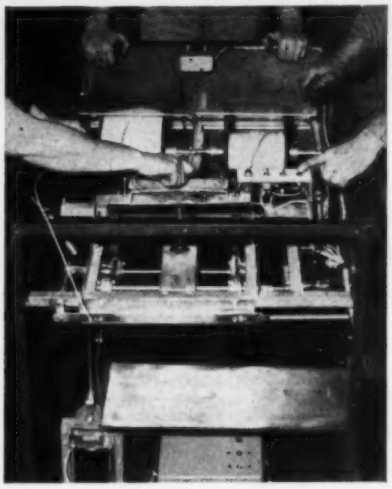
BNF estimates that it uses about 90 feet of hose costing about $90 a foot in a single engine installation. In the past, problems of lost time and wastage in cutting bulk hose by the hack saw method were many. It was just too difficult to get a straight cut hose end. To speed up the operation Holt and Alldredge developed a $200 machine that



HOSE ASSEMBLY

now produces a perfectly cut end on Aeroquip #24 hose in four seconds.

• **Companion** to the cutter is an assembly machine that obsoletes the vise and wrench operation formerly used. Now a light push of a lever moves the hose into the fitting in a few seconds. Only half of the former labor is required and a single mechanic can build up about 15 hose assemblies in an hour.



WIRE CUTTER

HOSE CUTTER

ELECTRICAL TESTER

• **Wire Dispenser**—Another BNF development is a portable wire cabinet and cutter that stores 16 and 18 gauge cable, measures the length required, automatically cuts the wire, and then dispenses it. In use, all the mechanic has to do is set a dial for the desired wire length and push a button. An old gear box from a B-29 bomber does the measuring through a series of pulleys. A retired Geneva Loc actuator rolls the wire out to the desired length and automatically shuts off. After that, a simple switch actuates a solenoid to cut the wire.

Increased Overhaul Periods Save Lake Central Money

Annual savings of better than $10,000 are expected by Lake Central Airlines as the result of increased engine and aircraft overhaul periods.

George Stubbs, LCA maintenance superintendent, estimates that an engine time extension from 1000 to 1100 hours for its fleet of six DC-3's alone will save $7200 a year and that a newly approved 9000-hour airframe overhaul will net the airline $2900 more.

Autofeathering Troubles

Sluggish autofeathering system operation on Douglas DC-7 TC-18 Turbo Compound engines can result from low oil temperatures, experience at American Airlines has shown.

As a troubleshooting tip to its mechanics, AA suggests that autofeather checks not be attempted until indicated oil temperature is at least 40°C. Otherwise, cold oil will cause sufficiently high nose-section pressures to seriously retard autofeather pressure switch actuation.

Plastic Wind Tunnel Models

Glenn L. Martin Co. has adopted the use of plastic wind tunnel models for supersonic research testing in a program aimed at halting the high cost of machined steel models.

Martin has found that plastic components such as the nacelle pictured here are economical to mold, can be produced in many variations, and are generally more versatile than their steel predecessors. For example, in the model shown, more than 50 pressure measurement tubes are embedded in the plastic.

Big Engine Overhaul Shop Opened by NWA

A $70,000 engine overhaul facilities expansion recently completed by Northwest Orient Airlines at its Holman Municipal Airport base in St. Paul, Minn. will give that carrier a single engine overhaul production line capable of handling five different engine types.

The shop expansion, undertaken in anticipation of the arrival of its four new Lockheed 1049G Super Constellations this spring, features a "continuous flow" overhaul system fed by overhead conveyors, cranes, and hoists strategically spotted along the line. Final layout grew out of an extensive tour of other airline shops with refinements suggested by NWA personnel.

COMMAND PERFORMANCE

...FLYING BOXCAR JOINS SAC TEAM!

The Strategic Air Command crest, which appears on all SAC planes, depicts force through a mailed fist holding in readiness symbolic lightning bolts of destruction and an olive branch. The white clouds and field of blue sky in the crest symbolize the global capabilities of SAC.

•

Enlist to fly
in the
U. S. Air Force

Fairchild's C-119 Flying Boxcar has joined the key support elements of the Strategic Air Command, the nation's long-range defensive air arm. To the combat proven Flying Boxcar will go new responsibilities for the movement of personnel, equipment and cargo in the global theatre of SAC operations.

Since SAC was organized it has constantly expanded and improved its facilities, and today stands as a symbol of strength in the maintenance of world peace.

The Flying Boxcar, in its role of logistical support of SAC men and planes, will substantially increase the effectiveness of America's front line of defense. Fairchild takes pride in participating in this important Command Performance.

ENGINE AND AIRPLANE CORPORATION
FAIRCHILD
Aircraft Division
HAGERSTOWN, MARYLAND

"where the future is measured in light-years"

Other Divisions: American Helicopter Division, Manhattan Beach, Calif.; Engine Division, Farmingdale, N. Y. Guided Missiles Division, Wyandanch, N. Y.; Kinetics Division, New York, N. Y. Speed Control Division, St. Augustine, Fla.; Stratos Division, Bay Shore, N. Y.

PEOPLE

New Appointments To CAL/PAL Combine

New executive appointments for the combined operations of **Continental Air Lines** and **Pioneer Air Lines**, due to begin April 1, find:

C. C. West, senior v.p.-CAL, moving up to exec. v.p.; **Stanley O. Halberg**, CAL v.p.-traffic and sales, to v.p.-public relations and advertising; **Harding L. Lawrence**, v.p.-traffic and sales for PAL, to v.p.-traffic and sales; **Harold B. Seifert** to v.p.-operations and maintenance of CAL's Dallas base; and **George J. M. Kelly** to ass't to exec. v.p. Unchanged are the positions of **O. R. Hauter**, v.p.-operations, maintenance and engineering; **Joseph A. Uhl**, v.p. and treasurer; **Lynn H. Dennis**, v.p.-flight service; and **Sam B. Redmond**, secretary.

Airlines

Ike Lasseter named ass't to v.p.-finance of Delta Air Lines from gen. revenue accountant.

L. J. Priester, formerly director of general services for Air Cargo, Inc., named cargo sales mgr. of Braniff Airways.

O. M. Nelson reelected president and board chairman of Transocean Air Lines.

Guy N. Tomberlin named v.p. of Riddle Airlines to direct stations, flight operations, and maintenance.

Fred C. Colborne named Alberta Province sales mgr. of Western Air Lines.

Jacques Francis Berrier of France named director of the bureau of admistation and services of the International Civil Aviation Organization.

J. Woodrow Thomas, Trans World Airlines, transferred from director of state affairs in Kansas City to Washington, D. C. as director of civic affairs.

Manufacturing

Douglas Aircraft has expanded its commercial sales division, promoting: **J. O. Moxness** to director of domestic commercial sales; **J. W. Clyne** to director of international commercial sales; and **M. E. Oliveau** to director—European Div.

William Davey elected v.p.-manufacturing of Piasecki Helicopter Corp., from director of manufacturing.

Robert G. Hess named v.p.-operations of the Pesco Products Div. Borg-Warner Corp., from gen. mgr., Watertown Div., New York Air Brake Co.

Brig. Gen. Peter C. Sandretto USAF (Ret.), and **A. G. Clavier** appointed ass't v.p.'s of Federal Telecommunication Laboratories Div. of International Telephone and Telegraph Corp. Both will serve as general coordinators for research and development projects, with Sandretto responsible for those sponsored by the military and Clavier for company-sponsored projects.

Charlotte S. De Armond, formerly director of public relations for Pacific Airmotive Corp., named director of public relations of Hoffman Electronics Corp.

C. R. Lemonier named to head Fairchild Engine and Airplane Corp. Guided Missile Div.'s new facility (plastics) at Copiague, L. I.

LOWANCE

SANDRETTO

J. J. Synar named mgr.-advertising and sales promotion for General Electric Co.'s Southwestern Dist., with headquarters in Dallas. He replaces Clayton S. Scott, named director of share-owner relations.

Thomas P. Lombardo elected a v.p. of Dallas Avionics from engineering and sales mgr. of Dallas Aero Service, an associated company.

John D. Russell, formerly mgr. of engineering, named v.p.-engineering of Joy Manufacturing Co.

N. F. Vanderlipp elected a v.p. of Hayes Aircraft Corp.

Barry B. Willis, formerly v.p-operations, promoted to exec. v.p. and gen. mgr. of Pastushin Aviation Corp.

Frank F. Davis, formerly ass't to the v.p.-engineering and maintenance of United Air Lines, named Super Constellation project sales engineer for Lockheed Aircraft Corp.

John Clark Vaughan named staff ass't to the president of Curtiss-Wright Corp. and mgr. of the Washington office.

Dr. Franklin E. Lowance, formerly associate technical director at the U. S. Naval Ordnance Test Station, appointed director of research and engineering for Westinghouse Air Brake Co.

Leon H. Fish, Jr. appointed mgr. of Solar Aircraft Co.'s Dayton office.

Adam E. Abel promoted from assistant to director of engineering and research for Bendix Radio Communications Div., Bendix Aviation Corp., replacing Arthur C. Omberg, now ass't gen. mgr. of the Bendix Missile Sect.

George E. McKinley, Jr. named supervisor of Dallas Aero Service's instrument shops.

William D. Hammond appointed domestic mgr. to head Lockheed Aircraft Service-Overseas' new domestic office at Burbank, Calif.

Walker G. Thornby, named field engineer for Robertshaw-Fulton Controls Co.'s Anaheim Div. He will be located in Washington, D. C.

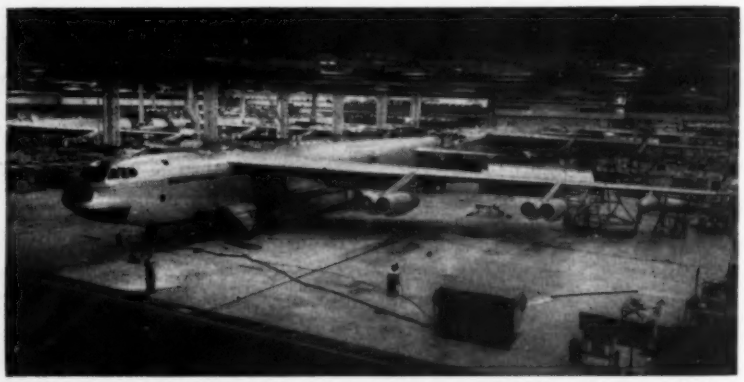
R. B. Grant, formerly regional industrial mgr.-Pacific region for Minneapolis-Honeywell Regulator Co., now Los Angeles branch mgr.

L. Byron Post appointed superintendent of production and service for Dallas Aero Service from Page Aircraft Industries in Oklahoma City.

Harry H. Wallace named customer relations mgr. of Fairchild Engine and Airplane Corp.'s speed control div.

Myron G. Domsitz named chief engineer of Simmonds Aerocessories, Inc. from associate technical director of the Diamond Ordnance Fuze Laboratory, Dept. of Defense.

Robert J. Boyne placed in charge of sales activities for Aerosmith Inc.'s seat division following the resignation of Ralph V. Shelton as mgr.



THROUGH THESE DOORS rolls a completed Boeing B-52 Stratofortress, affording a view of the company's Seattle plant production line. Entire line will now advance one step in production sequence.

Bell Wins Army Helicopter Competition

The Army's utility helicopter competition has been won by the Bell Aircraft Corp. The winning design, designated the Model 212 by the manufacturer, will be developed at Bell's plant at Fort Worth, Texas. Eight firms had participated in the competition.

Preliminary engineering and construction of a mock-up will be covered by the initial contract. Limited quantities for evaluation will call for another contract later.

Proposal calls for a closed-cabin, single-rotor design, with 800 lb. payload, 100 knot cruising speed, 6000 foot hovering ceiling, and 1500 fpm rate of climb. The Army plans to use the rotorcraft for evacuation, utility, and instrument training.

Reduce Air Frame Weight

as Grumman does on its New F9F-9

Use AEROQUIP 617 LIGHTWEIGHT AIR FRAME HOSE For Fuel And Oil Lines

The Navy's newest jet fighter, the Grumman F9F-9, is one of the world's few combat planes capable of supersonic speeds in level flight.

Important savings in weight were achieved by using Aeroquip 617 lightweight air frame hose instead of conventional types for fuel and oil lines.

Aeroquip 617 hose is recommended for use with lubricating oils made to specification MIL-L-7808 as well as petroleum products. Complete technical information is given in Aircraft Engineering Bulletin AEB-2 . . . please write for it.

A lighter wire braid imbedded in a thin, tough wall reduces hose weight without sacrificing performance.

Detachable, reusable aluminum fittings designed with extremely short socket provide further weight savings.

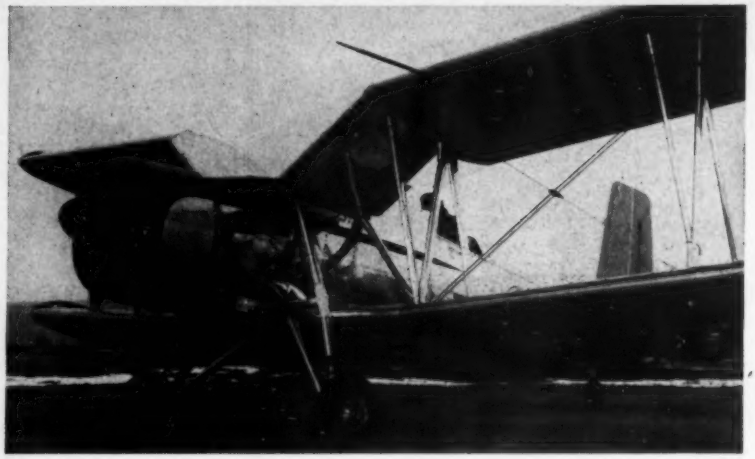
Aeroquip

REG. TRADE MARK

AEROQUIP CORPORATION, JACKSON, MICHIGAN
AERO-COUPLING CORPORATION, BURBANK, CALIFORNIA
(A Subsidiary of Aeroquip Corporation)

Manufacturers of Aeroquip Flexible Hose Lines with detachable, reusable Fittings; Self-Sealing Couplings; Brazed Aluminum Elbows
LOCAL REPRESENTATIVES IN PRINCIPAL CITIES IN U.S.A AND ABROAD • AEROQUIP PRODUCTS ARE FULLY PROTECTED BY PATENTS IN U.S.A AND ABROAD

Circle No. 21 on Reader Service Card.



Air-Tractor Deliveries In March

CAA CERTIFICATION TESTS are under way on Lamson Aircraft's gull-winged Air-Tractor, following the first flight series on the first production model.

Changes from the prototype include: elimination of openwork fuselage; completely metal-covered fuselage, wing stubs, and gulls; hinged side panels for ease of cleaning. The production aircraft also features lighter wing and tail panel construction.

Powered by a P&W Wasp Jr. 450-hp engine, the plane breaks ground without a load in less than 250 feet, with spray load of 1150 lbs.—600 feet, and with one ton of spray—910 feet. First commercial delivery is scheduled for March.

Agricultural Flying Climbs to Third In Civil Aviation Activities

AGRICULTURAL FLYING now ranks third in civil aviation activities according to a report in the Journal of Agriculture and Food Chemistry. Cited as a $45 million business, the report states that agri-flyers logged 700,000 flight hours in 1953 with more than 2000 crop dusting and spraying firms in existence. More than 7000 aircraft treated about 40 million acres from the air.

The following tables compiled by CAA for 1953 show number of aircraft and pilots by agricultural activity, and acreage treated in continental U. S.:

Acreage Treated
(000 omitted)

Activity	1952	1953
Dusting	16,802	13,476
Spraying	13,046	17,188
Seeding	1,860	2,123
Fertilizing	2,328	2,873
Defoliation	1,760	1,885
Grasshopper baiting	314	693
Spraying towns	1,311	680
Total	37,421	38,918

Activity	Number of Aircraft By Type					No. of Pilots
	Light	Medium	Heavy	Helicopter	Total	
Dusting	722	1542	5	19	2288	2287
Spraying	1162	1256	21	28	2467	2564
Seeding	230	701	.....	5	936	933
Fertilizing	233	658	.....	2	893	841
Defoliation	416	831	.....	6	1253	1135
Grasshopper baiting	51	86	2	1	140	142
Spraying towns—pest control	138	80	1	5	224	239
Agitating cherry trees	1	4	.....	8	13	14
Anti-frost agitation	24	59	.....	2	85	77
Knocking fruit from trees	.....	7	.....	2	9	14
Checking fallow land	43	32	.....	.....	75	70
Chasing birds—rice fields	44	18	.....	1	63	74
Checking crops	191	58	.....	1	250	281

Board Votes to Create Office of President

NATIONAL BUSINESS Aircraft Association membership will be asked to comment on proposed reorganization and revision of bylaws. The board of directors met recently in Chicago to put the stamp of approval on the plans calling for elimination of the chairman of the board and creation of the office of president, and for appointment of regional vice presidents to strengthen local chapters. Other actions taken by the board:

• **Requests to CAB** to hold public hearings on the proposed rule which would eliminate annual airworthiness inspection for non-carrier aircraft, substituting a 100-hour check on progressive inspection (AMERICAN AVIATION, *Jan. 3, p. 54*). In urging postponement of adoption until hearings are held, Chairman Henry W. Boggess labeled the draft release "extremely complicated, involving many factors which undoubtedly warrant a close scrutiny by all operators in . . . civil aviation . . ." Points NBAA would like cleared are—(1) Possibility of increased maintenance costs; (2) Possible curtailment of flight operations; and (3) Chance of the regulation resulting in "subsidizing" repair stations.

• **Request to Congress** to consider a public airport program adequate for the nation's progress and security. "The lack of an adequate number of usable airports in industrial communities," Boggess stated, "provides a handicap to the maximum utilization of existing business airplanes. Airports in these communities, like highways, are a public necessity."

• **Request to CAA** Administrator Fred B. Lee to consider certain revisions to air traffic rules in CAR Part 60 "in view of the number of recent serious accidents and many known 'near misses.'" NBAA feels such accidents could be minimized by: (1) changing the minimums within control zones to ceilings of less than 2000 ft. or less than 500 ft. vertically and 2000 ft. horizontally from any cloud formation; and (2) by prohibiting operation of aircraft in control zones when visibility is less than five miles without air traffic control clearance. NBAA "does not believe (the latter) would disturb the freedom of VFR movement by aircraft." • • •

TRANSPORT TRENDS

Washington, D. C., Feb. 28, 1955

BRITAIN'S JET TRANSPORT LEADERSHIP has ceased to exist. This is an obvious conclusion from newly announced program for the de Havilland Comet series. British Overseas Airways Corp. has decided:

Comet I planes that originally formed BOAC's fleet will not be used again in public passenger service. Fewer than half the original 21 Comet I's remain.

Orders for new Comets will be increased as soon as numbers and delivery dates are agreed upon. The decision to "increase our orders" may apply to modified Comet II's, still in early production stages, but is more apt to mean orders for more Comet III's or a version thereof incorporating the lessons learned from the accident investigations.

BOAC's announced intention to give the Comets "many thousands of hours on service tests and route familiarization before they are put into passenger service" spells many months and possibly years of delay at any rate.

Fate of eight Comet II's already completed and 14 more in advanced stages of completion is still clouded. Seven airlines had ordered 33 of these planes on which production has been suspended for nine months. While reworking is still possible, reports indicate the planes are more apt to go into military tanker service or into training activity with cabins unpressurized.

Earliest delivery estimate for Comet III's, prior to past six months of Comet investigations, was 1957. Although the prototype Comet III underwent initial flight trials during the inquiry, production deliveries have certainly been delayed beyond the availability dates of the Boeing 707 in early 1958.

PERMANENT CERTIFICATION OF LOCAL SERVICE air carriers stands a good chance of favorable action by the Senate Commerce Committee and a fair chance of passage during this session of Congress.

CAB's opposition to permanent certification has been largely diluted by provisions of Sen. Warren G. Magnuson's bill (S. 651) which would permit the Board to name temporary intermediate points when awarding certificates. This overcomes objections to fixing route structures which are not yet stabilized.

Major factor weighing against permanent certification is an amendment tying all-cargo carrier certification to the local service carrier bill.

GOVERNMENT RESPONSIBILITY IN GENERAL AIRCRAFT ACCIDENTS, as a result of negligent action by control tower operators, is the precedent established earlier this month by a U. S. Court of Appeals ruling. Case involved was the Eastern Air Lines/Bolivian fighter plane collision at Washington National Airport in 1949. Court ruling blamed tower operators for clearing both planes to land simultaneously.

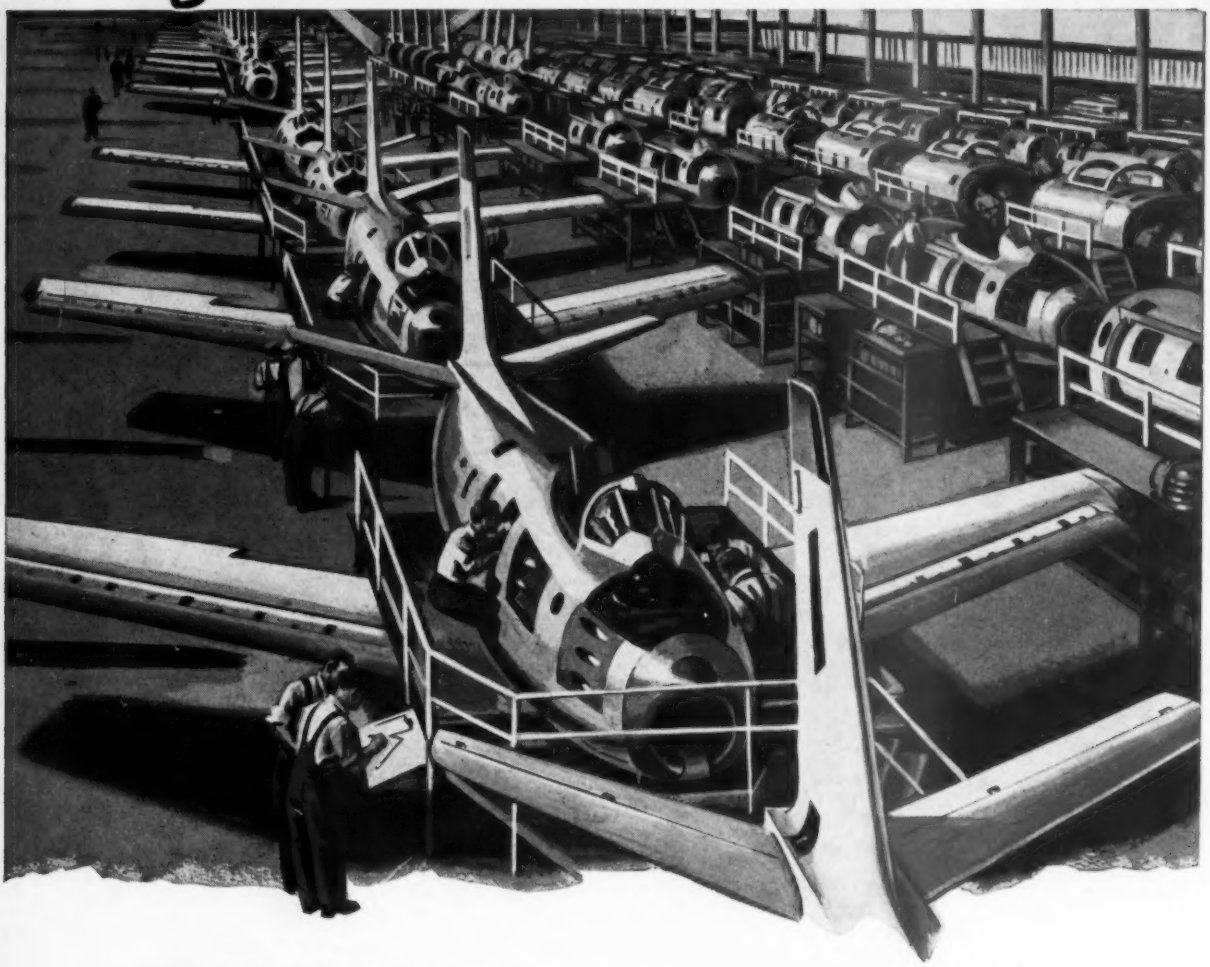
Airline responsibility, to be decided by a new trial, must be settled before action on the 53 other suits totaling about $7 million in this case.

TWO CLASSES OF TRANSPORT HELICOPTERS would be established by a proposed Civil Air Regulation, Part 7, now being drafted by CAB's Bureau of Safety Regulations.

Category A would cover multi-engine rotorcraft for unlimited scheduled or non-scheduled passenger and cargo operations.

Category B types would be restricted to 17,500 lbs. maximum gross weight, could be single- or multi-engine, and could be used in these same services under limited operating conditions.

A Single Goal...



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Canadair's leadership is proven by past production of civil and military four-engined aircraft, as well as by its record of continuous production of jet fighters and trainers — and soon to appear will be a military version of the Bristol Britannia, redesigned by Canadair engineers as a reconnaissance aircraft for the R.C.A.F.

Canadair's production experience is an excellent recommendation to those buying military or commercial aircraft — another reason why people who know say "you can count on Canadair."

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Transport Aviation

Democrats Move to Trim White House Power After Route Case Fiasco

BY WILLIAM V. HENZEY

THE BIGGEST HOLE in the Civil Aeronautics Act—that which funnels all overseas and international route decisions to the White House for final action—will be at least partially plugged if the Democratic-controlled 84th Congress has its say.

The White House role in airline cases became a target early this month with the double-reverse handling of the Transpacific and West Coast-Hawaii Cases.

By the time other important pending international cases, such as New York-Balboa, Transatlantic Cargo, and States-Alaska, are ruled on by the President, the section of the Act involved may be even more vulnerable than now.

Senator Warren G. Magnuson (D.-Wash.), chairman of the powerful Senate Commerce Committee, planned the opening salvo during the week of Feb. 21 when he contemplated including in a proposed omnibus aviation bill legislation which would "trim the White House powers over the granting of airline routes."

MAGNUSON

Magnuson said his bill would include a specific prohibition against Presidential reversal of CAB decisions on Hawaii and Alaska routes. He further indicated he would entertain amendments to define and limit Presidential powers over "truly international" routes.

Openly incensed over the handling of the Pacific area cases (and recognizing the political opportunity presented), Senators Humphrey (D.-Minn.), Neuberger (D.-Ore.), and Morse (I.-Ore.), to name a few, plus many U. S. representatives, voiced the need in Congress for close scrutiny of the President's powers. It was expected one or more of them would follow through with the amendments mentioned by Magnuson.

Giving impetus to this development, of course, was the unprecedented situation where the White House reversed the CAB in major Pacific area matters and, within a week, reversed itself. Though anti-climatic now, it is significant background to note that CAB reversed itself many times in its three months of deliberations in the cases.

The specific point with the White House, however, dealt with service between Seattle/Portland and Hawaii. By letter of Feb. 1 to CAB's acting chairman, Chan Gurney, the President overruled a 5-0 CAB vote which favored permanent renewal of Northwest Airlines on the route and termination of PAA's service.

• **The White House** decision was to drop Northwest and renew Pan Am on the route for five years.

But somewhere in the Executive Mansion a procedural move was overlooked. Never before had a Presidential decision in an international airline case been released publicly before an official CAB order had been signed by the President. But it happened here even though an appropriate CAB order was available for the President's signature before release of the White House decision.

THYE

The move permitted time for a wave of public protests which, coupled with strong Congressional pressure, resulted in a unique White House meeting on Saturday morning, Feb. 5.

Here the President listened to "additional facts" presented by Sen. Edward J. Thye and Rep. Walter Judd, Minnesota Republicans. From CAB, Gurney and general counsel Emory T. Nunneley were present. From Commerce, Secretary Weeks and former Under Secretary Robert B. Murray sat in. Also present was the President's assistant, Sherman Adams.

It was described by several present as a "table-pounding" session with Eisenhower, obviously disturbed over the occasion which was allowed to arise, doing the pounding. He was disturbed particularly when he reasoned that the new facts dictated a different decision than that which he had previously signed.

HUMPHREY

It was agreed at the meeting that the original decision would be changed and on the following Monday (Feb. 7) another letter was sent to CAB by Eisenhower in which he "modified" the original decision to renew both Northwest and Pan American for three years on the Hawaiian route.

• **As it turned out,** however, the "new facts" given by the President as the reason for his change weren't new at all. They were new to him but only because they hadn't before been brought to his attention.

For example, much weight was given to the newly discovered fact that NWA had offered to operate the Hawaii route without subsidy. But this offer was made at oral argument before CAB in early 1954 and was a matter of public record.

Then there was the report from the White House meeting which indicated the President was not aware that his original decision to drop NWA from Hawaii was in the face of a 5-0 CAB vote favoring renewal of Northwest alone.

Also, the possibility that Pacific carriers might be off subsidy in the near future, though a recent development and a major factor in the White House reversal, was known for at least a month before the President's Feb. 1 action. That subsidy-free possibility is associated with the decision of the Defense Department to ship overseas military mail via commercial airlines.

• **Thus, it appears quite clear** that: (1) the pressure of thousands of telegrams and the follow-through by appropriate Congressmen were instrumental in the President taking another look at the case; (2) the reversal stemmed more from "first-acquaintance" with existing facts than from development of "new facts"; and (3) the advice to the President before signing his original decision was something less than complete.

What Congress can or should be expected to look into, therefore, is the weakness in the regulatory scheme which permits decisions on air routes of tremendous importance to be made in such haphazard fashion. Their susceptibility to pressures from the industry, inside the government itself, and the public in general is an alarming situation.

The CAB was created in 1938 to avoid such situations and, with respect to domestic cases, that generally is the case. But it has been recorded that the only way Congress in 1938 got President Roosevelt to go along with relinquishing control of the growing aviation industry was to permit the President to retain final say on territorial and international routes.

Since that time, every major international case has been an episode in pressures, intrigue, and generally bad publicity for all concerned, including the administration in office. • • •

CAB Now Favors Three Carriers in Alaska

THE MUCH-REVERSED States-Alaska Case has undergone another CAB vote, this time generally in favor of a three-carrier network comprised of Northwest, Pan American, and Pacific Northern.

The new vote, taken in private conference early in February, restores PNA but lacks support for renewal of Alaska Airlines between Seattle and Fairbanks. It supersedes a Dec. 8, 1954 vote in which the board decided to drop both PNA and Alaska.

At presstime the board's staff was preparing a new opinion but there were no other indications the agency had finally settled on a proposal to submit to the White House. Instead, there was belief that the board might stall until member-nominee Ross Rizley takes his seat.

Currently, Northwest and PNA hold temporary certificates between Seattle and Anchorage, Alaska holds a temporary certificate between Seattle and Fairbanks, and Pan American holds a permanent authorization between Seattle and Fairbanks.

Here is how the four-man board voted at its latest February meeting:

• **On continuing four lines in the area,** members Gurney and Denny oppose, members Lee and Adams favor.

• **On continuing three lines (NWA, PAA, and PNA),** members Gurney, Denny, and Lee favor, Adams opposes because of exclusion of Alaska Airlines.

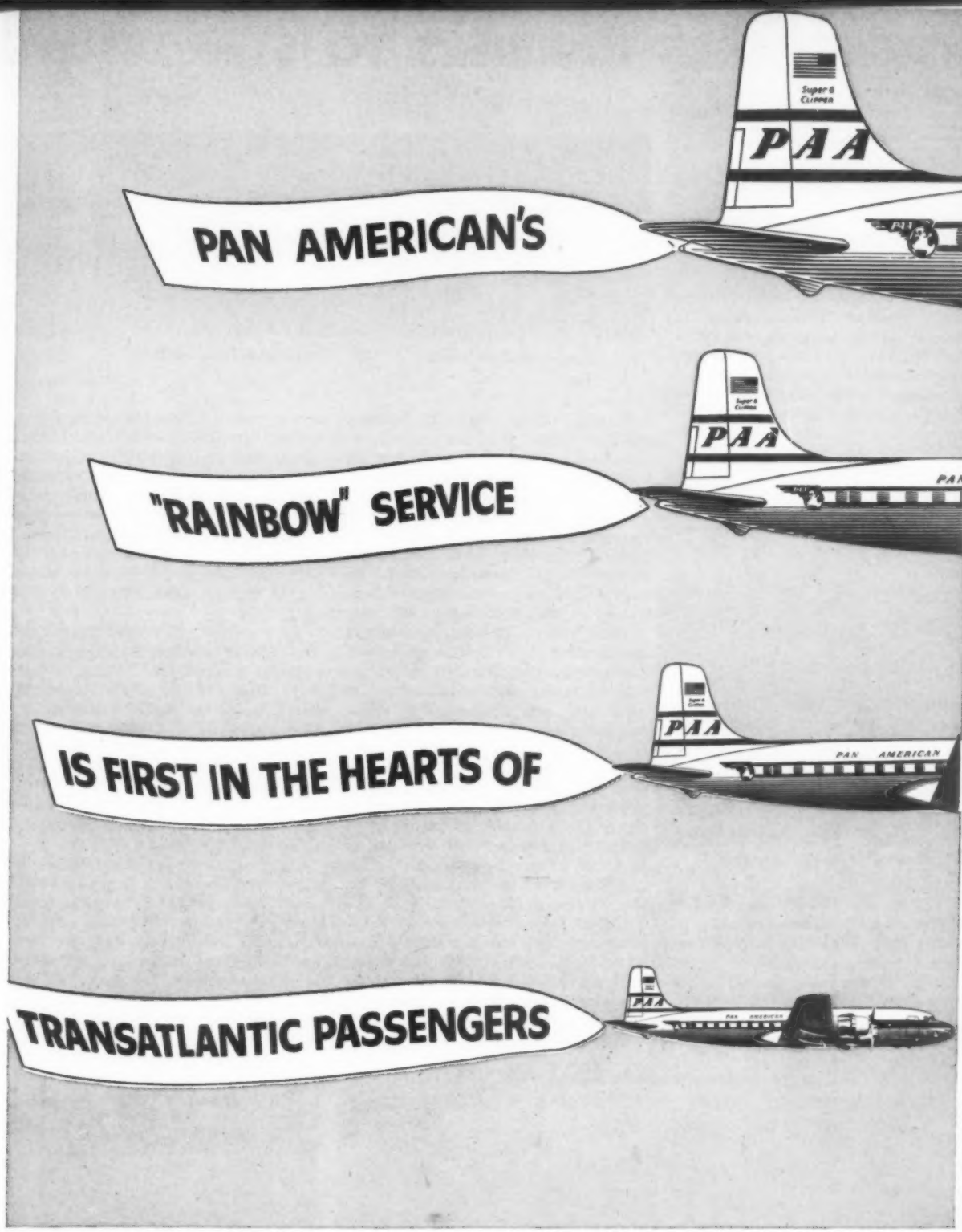
• **On a move to certificate Pan Am into Anchorage** as well as Fairbanks, members Denny, Lee, and Adams oppose, member Gurney favors.

L. A. Airways Establishes Industrial Helicopter Div.

Los Angeles Airways has established an industrial division to provide consulting service on helicopter operating techniques, heliport construction, and other problems identified with helicopter flying.

First contract is with the California Co., New Orleans, La., to advise it on its tidelands transportation problems, for which it is acquiring two Sikorsky S-55's. The California Co. is an oil producing subsidiary of Standard Oil Co. of California. Robert Bromberger, LA Airways supervisor of flight training, headed the consulting contingent in New Orleans.

Clarence Belinn, LA Airways president, said the pioneer helicopter mail carrier was prepared to act as a general management consultant or on individual projects. Consulting fees have been set at $100 a day.



In 1954: Pan Am's "Rainbow" flew 95,800 people—more than any other transatlantic air tourist service

BOEING ASKS CARRIERS TO STEP UP WITH 70

BY WILLIAM D. PERREAULT

THE BIG QUESTION standing between the airlines and a firm order for Boeing 707 jet transports seems to have been: When and how much?

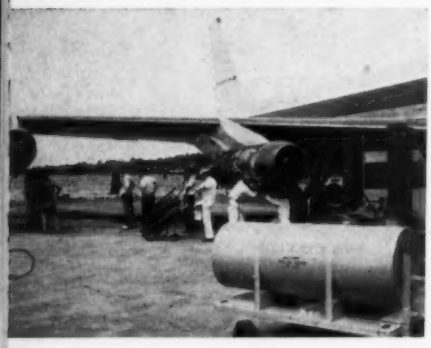
Now the airlines have been supplied the answers to both questions. Boeing president William Allen, in letters to airline presidents, has set a tentative price of $4.25 million per plane for the four-engine Stratoliner and assured early 1958 deliveries for the airline placing its order by this spring.

To make good on delivery Boeing must get the approval of the U. S. Air Force for production of the commercial airliner in the government-owned facility and with tools designed

Gear down, doors closed.

Doors open after take-off.

Gear retracts.



Engines can be easily reached.

to produce the KC-135 Stratotanker. As a consequence, Allen has asked interested airlines to step forward and place a production-notice type agreement so Boeing can discuss specific plans with USAF.

What Allen is seeking is an airline/manufacturer agreement in which a binding contract results if the final purchase price does not exceed an agreed-upon level, deliveries are on schedule, and there is no major change in the aircraft specification.

Armed with this agreement, Boeing would negotiate production arrangements with USAF. As Boeing now sees it, an airline ordering 25 jet-powered 707's in the next few months would get the first delivery in early '58 and have all 25 aircraft within 17 months of that time. If a second airline ordered the civil version of the military tanker at the same time, it could get its initial delivery three months after the first airline, or in mid-1958.

The scope of Boeing's production plan is highlighted by the company prediction that it could deliver 20 planes in 14 months, 15 planes in 11 months, 12 planes in 10 months, or 10 planes in nine months.

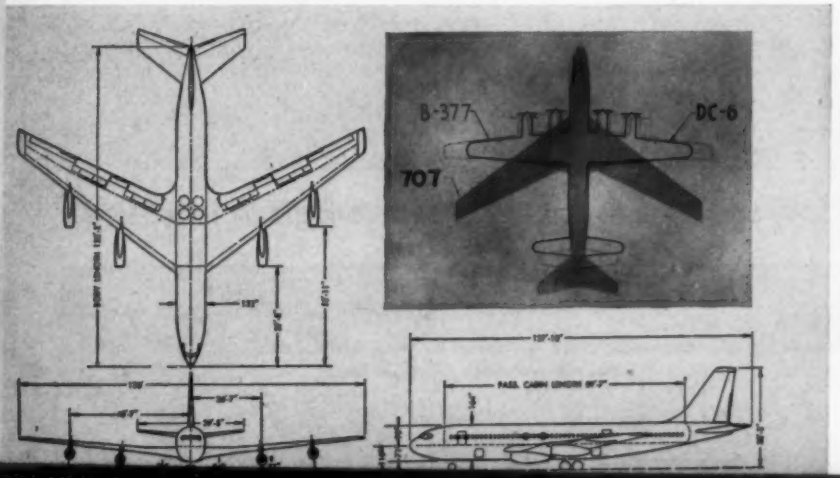
The price of $4.25 million per plane is based on orders for 50 civil transports. The price of the jet transports no longer seems to be the issue it once posed. Presumably this is the price of the 210,000-lb. version of the prototype 707 which Boeing has been discussing with individual airlines. Boeing claims that the work capacity of the jet is 3-4 times better than that of the best piston-powered transport.

Another factor is the high cost of the powerplants themselves. During Congressional testimony last year, USAF officials cited the cost of the 10,000-lb. thrust J57 as $250,000 each. This should be somewhat lower by the time civil production is undertaken, but is the last official figure on J57 costs.

If Boeing's economic claims for the 707 hold up (see graphs), it should prove a moneymaker. During a talk before The Institute of the Aeronautical Sciences in Seattle last August, M. L. Pennell, 707 project engineer during the plane's design period, presented the direct operating cost and work capacity charts shown here. They show DOC about 50% lower than present-day transports per available ton-mile.

For instance, Pennell showed the direct operating cost of the 707 at 1000 nautical-mile range to be about nine cents per available ton-nautical-mile, as constrasted with 14-17 cents for current four-engine transports. CAB member Joseph Adams, on hand at the IAS meeting, termed these figures "very significant." In formal releases of the Pennell paper, and in public eco-

How the 707 compares with current transports.



Flight engineer's panel.

TH707 ORDERS

Gear retracts.

Doors are closing.

Gear fully retracted.

America's first transport.

nomic discussions since that time, Boeing has used non-dimensional graphs covering both operating costs and work capacity.

At Seattle, work capacity of the 707 was cited as 9000 available ton-knots at 1000 nautical miles range while "current four-engine transports" were credited with 2000-3000 available ton-knots at the same range.

These figures would translate into profitable operations providing the airlines could use the tremendous capacity and there is every indication that the long-haul airline operators can use it.

Boeing has been slow to discuss specific performance data on the 707 for general distribution, probably because of the many variables still undecided in final configuration. Previously, when quoting normal gross weight of the 707 as 190,000 lbs., Boeing released to potential customers the accompanying payload/range charts showing maximum payload as 30,000 lbs. to 1950 nautical miles range against 50-knot headwinds. This would mean more than 25,000 lbs. payload on trips of the New York-Los Angeles or New York-San Francisco type.

It is impossible to predict how much of the increased gross weight, from 190,000 to 210,000 lbs., will be translated into payload. These figures were based on 92,120 lbs. operating weight empty and assumed cruising at 80% normal rated power.

Meanwhile, Boeing is pushing production of the KC-135 tanker and hopes to make initial deliveries in October 1956. Best information regarding the USAF order indicates that 29 of the jet tankers were ordered from fiscal 1955 funds with a longer ranging program for 56 additional tankers from future funds. This does not weigh the outcome of the official USAF tanker competition, due to be decided any day now.

Boeing has set up numerous subcontractors to expedite KC-135 production:

- **Rohr Aircraft Corp.** will build engine mounting struts and pods, the horizontal stablizers, and elevators.
- **Twin Coach Co.,** Aircraft Div., will build vertical fin and rudder assemblies.
- **Bendix Aviation** is manufacturing main landing gears.
- **Ryan Aeronautical Co.** is building aft body sections and stabilizer torque box structures.
- **Menasco Manufacturing Co.** is building nose gear assemblies.
- **AiResearch Div.,** Garrett Corp., is supplying complete air conditioning equipment.

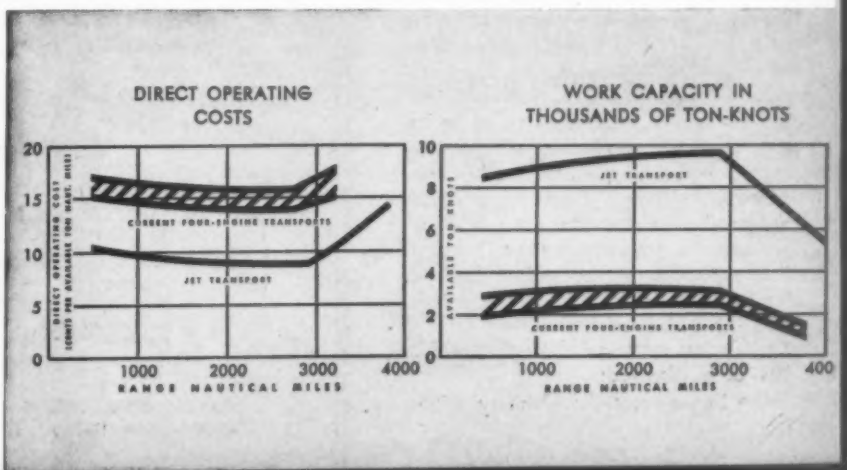
There have been various reports on Boeing's production plans. Boeing officials have maintained that the KC-135 would fill the gap left by declining production requirements for the KC-97 being built at Boeing's Renton, Wash., plant. Some 9000 employees were at work on tanker production in mid-1954 when the 500th plane was turned out. Although production was then scheduled for an early cutback, it has since been extended into mid-1956. This provides a natural production bridge between the two types.

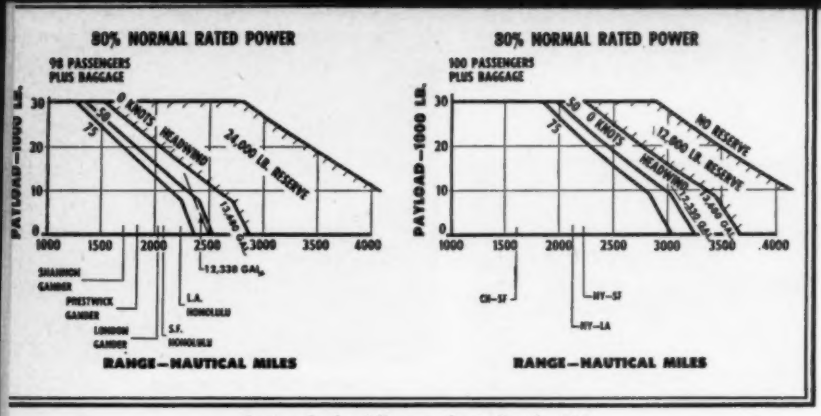
Main gear and wheel well

Boeing's first announcement of the jet transport prototype program was in the first week of September 1952. On May 14, 1954 the prototype rolled out

SecDef Wilson in cockpit.

Boeing's economic claims.





Boeing Payload/Range charts for the 707.

of the Renton plant and on July 15th the first flight of the 707 took place. Within eight days of the first flight Boeing was able to report the plane had made seven flights and logged 15 hours, 46 minutes flight time. In August the Air Force announced it had placed a limited order for Boeing's 717 (KC-135) jet tanker, even before USAF officials had flown in the plane.

By October 4 Boeing was able to announce it had completed its planned program for 50 hours of first phase testing in 43 hours, seven minutes time. Between October and January 2, 1955 the 707 had more than doubled this record, starting the new year with 92½ hours flight time.

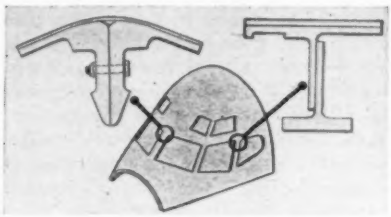
• **This has been** the remarkable record of the first U. S. jet transport. Its operations have been marred by two landing gear problems which proved to be incidents although they had potential for real trouble. The first was the collapse of the right main landing gear during taxiing tests due to failure of an attach fitting. The second was failure of the brakes on landing with subsequent destruction of the nose wheel gear when the plane left the runway and struck a culvert.

Both incidents were unfortunate and delayed the plane's testing. But both incidents also left lasting impressions of the integrity of the general configuration and structural arrangement of a new transport which could escape with relatively minor damage from accidents with such great destructive potential.

As the 707 has moved ahead on its test program, details of the various systems and arrangements have been released by bits and pieces, primarily in papers before the various technical societies. A recent paper on "Design Safety Aspects of the Boeing 707 Jet Transport," by E. W. Norris before IAS has added much data.

Typical systems information which has been disclosed:

• **Flight controls:** Primary flight controls are 100% manually operated, no power assist being provided (see page 72). Controls are actuated by spring tabs, connected by cable to the pilot's wheel and rudder pedals. Hydraulic snubbers on control surfaces replace manually operated gustlocks,



Multi-path structure.

eliminating the possibility of taking-off with controls "locked" as has happened in some earlier transports.

The ailerons are split into two sections on each wing. Normally the inboard section of aileron provides lateral control, but when the flaps are lowered connecting linkage cuts in the outboard or low-speed ailerons. The airelons are supplemented by hydraulically operated spoilers. Lateral control is so effective that, with flaps in any position, the 707 can be operated safely from airports with a 90° wind of 30 mph, according to Norris.

The spoilers, operated by a single lever, also serve to unload the wing during landing, permitting a 15-25% reduction in landing distance. Norris also noted that tests have established that the 707 can reduce its speed from cruising to that recommended for rough air in less than four miles. Lowering the landing gear will further cut this distance to two miles.

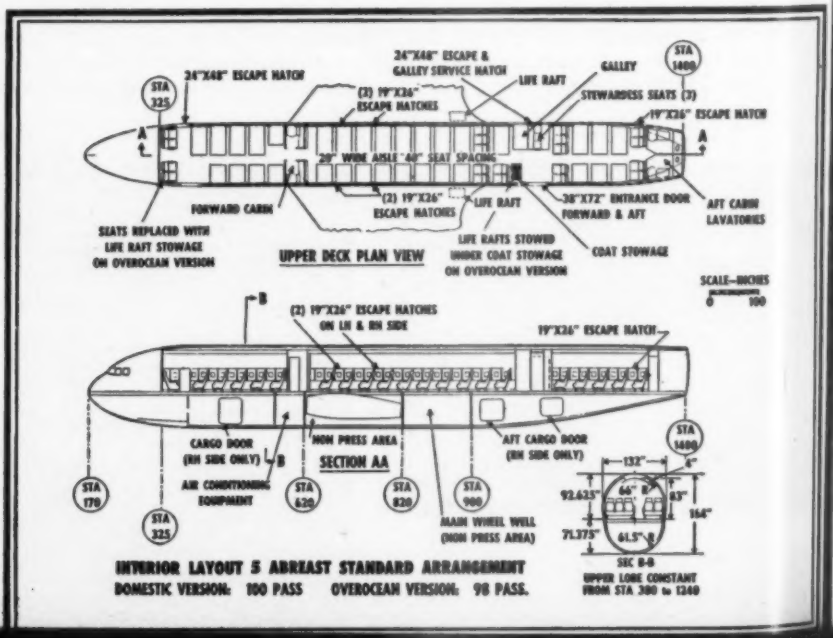
Wing flaps are of the double-slotted arrangement, split to avoid engine exhaust and providing a form of boundary layer control of considerable significance to control.

• **Fuel System:** Fuel is contained in eight integral wing tanks and totals 13,680 gallons. The regular tanks include two 1860-gallon units adjacent to the fuselage, two (one on each side) 2350-gallon tanks between the fuselage and inboard nacelles, two 2170-gallon tanks between the nacelles, and a 470-gallon unit in each outer wing panel. An additional 1000-gallons can be provided for in 500-gallon wing tip tanks, or 4200 gallons more in the wing centersection.

Fuel dump provisions are scheduled for the commercial model, according to Boeing's earlier literature on the plane. Each engine normally operates from its own tank. Each tank has two electric boost pumps operated from independent power supplies. An engine-driven pump backs up the electric boosters.

For convenience, fuel can also be drawn from the manifold connecting

Interior arrangement of 707.

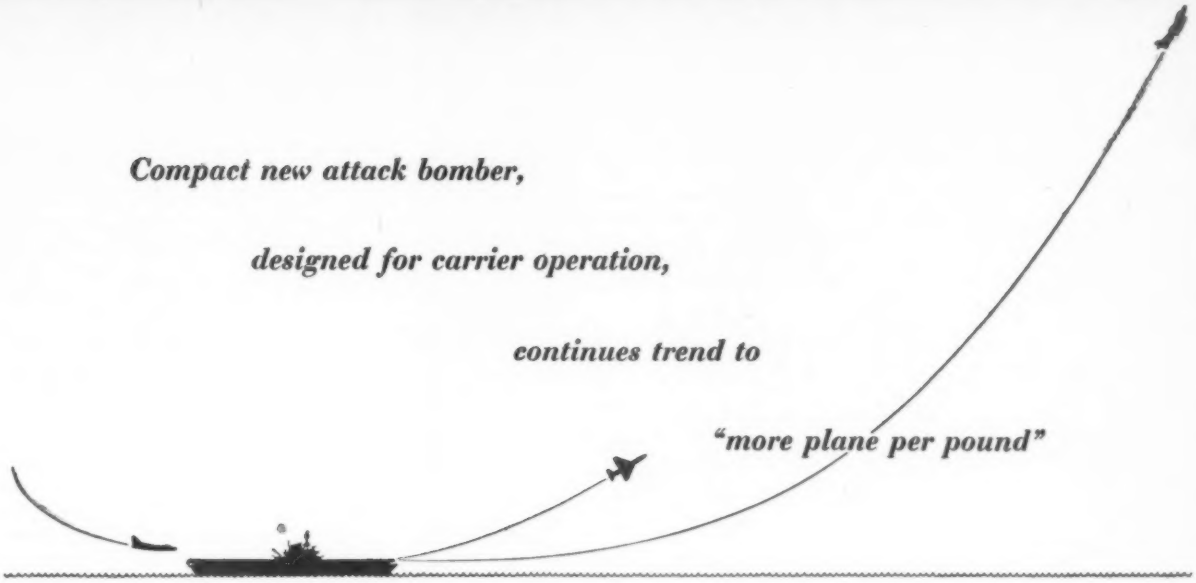


Compact new attack bomber,

designed for carrier operation,

continues trend to

"more plane per pound"



–the U. S. Navy's Douglas A4D Skyhawk

Continuing a growing trend, the Douglas A4D attains maximum efficiency—at lower production cost—through highly simplified design.

Faster than many of today's fighters, the Douglas A4D attack bomber is so compact that it can operate from carriers without folding its wings, giving a consequent reduction in weight, cost, and fuel consumption. In all respects the Skyhawk meets, and more than meets, demands on range, climb, armament, and load-carrying flexibility—exemplifying the Douglas philosophy of more performance per pound of airplane.

Performance of A4D shows Douglas leadership in aviation. Planes that can be built in quantity to *fly farther and faster with a bigger payload* are a basic rule of Douglas design.

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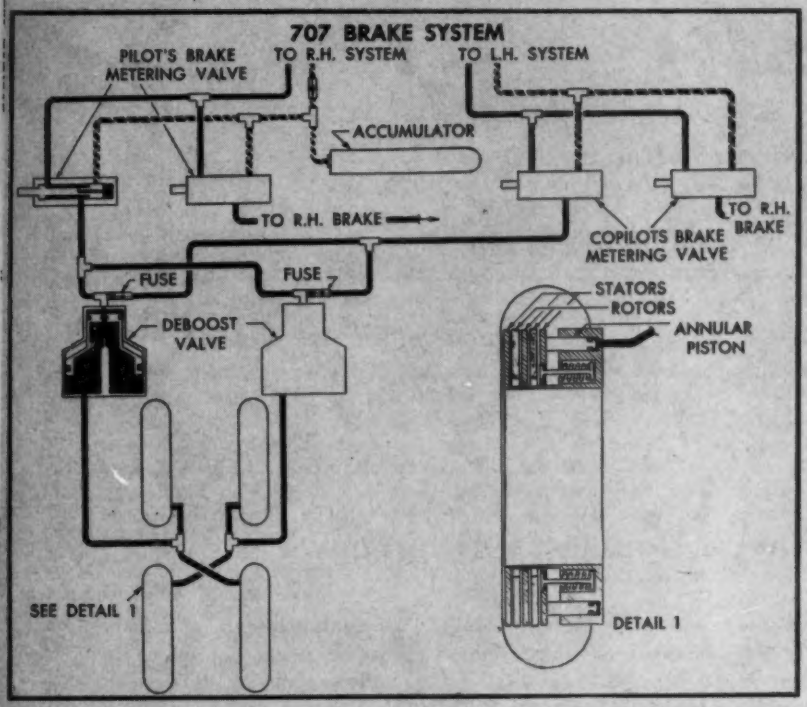

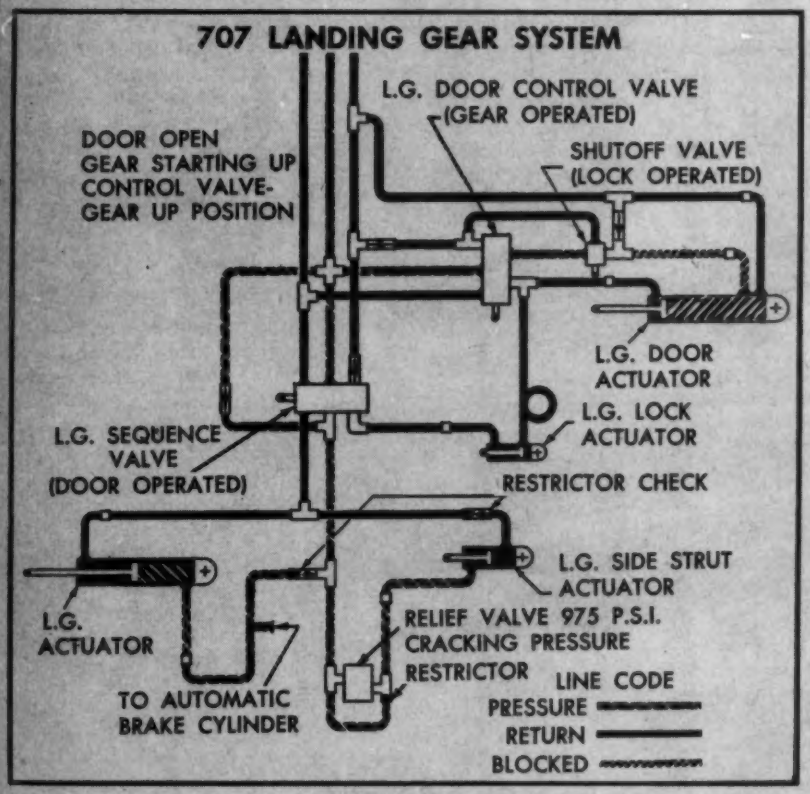

the main tanks to any engine or from the tank and manifold to the engine.

• **Hydraulic system:** This is a 3000-psi system used to operate the brakes (see drawing), landing gear, steering, spoilers, and flaps. Four hydraulic pumps one on each engine, supply the two independent systems which divide the hydraulic workload. A crossover valve permits the landing gear and flaps to be switched from one system to the other in an emergency. Hydraulic tanks are located in the wing tips and are pressurized to 35 psi. Cylindrical rather than spherical accumulators are used.

• **Air conditioning-pressurization:** High-temperature, high-pressure air is bled from the J57 engine for use in air conditioning. AiResearch is providing the duplicate air conditioning systems to control air flow and temperature. The cabin is pressurized to 8.6 psi. providing 7000-foot cabin altitude at 40,000 feet. This pressure differential contrasts with 2.5 psi for the Boeing 307 of 1936 and 6.5 for the Boeing Stratocruiser of 1942 design.

• **Engines:** Four Pratt & Whitney J57 engines, designated JT3L in the commercial version, power the standard KC-135 tanker and 707 transport. These engines are currently rated at 10,000 lbs. thrust but in-service upgrading is expected to boost this figure somewhat and improve aircraft performance proportionately.

The engines are mounted by three-point suspension, two forward attach points and one in the rear. Each of these attach points uses position-seeking cones to simplify installation. Plumbing disconnects (once designed for quick-disconnect but since changed over to standard connections) are on one side of the engine support strut while electrical disconnects are on the other.

Boeing claims that an engine change can be made in 20 minutes providing the replacement engine is in readiness. The generous cowling arrangements and engine height above ground (5 feet, 7 inches for the inboard engines) contribute to ease of maintenance as well as ease of engine changes.

The whole engine pod is well insulated from the wing. Fire detectors trigger a light in the cockpit fire switch which, when operated, isolate electrical and liquid at the wing (see page 72). Boeing claims that the frequency of engine fires for turbojet engines is 60% lower than that of piston engines.

Engine control is provided by a single lever operating a hydro-mechanical regulator. This is a factor Boeing has stressed as a major contribution to cokpit simplicity.

• **Cockpit arrangement:** "All normal and emergency cockpit functions can be handled safely and conveniently by a

Smooth Performance!

Trans-Canada's New Vickers Viscounts Rely on Pacitron Fuel Gaging Systems

Fuel Gage for the first Turboprop Airliner to go into service in North America

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In addition to dependable fuel measurement, the Pacitron Lightweight Fuel Gage System also makes possible the addition of important functions of fuel *management* and control. These include: automatic center of gravity control (i.e. control of fuel weight distribution), low level switching (thermistor level switches), and automatic load limit control in accordance with the flight plan.

Simmonds fuel gaging systems are now flying on 90 types of aircraft and on 40 U.S. and foreign flag airlines — a record for which Simmonds is recognized the world over as "first in electronic fuel gaging".

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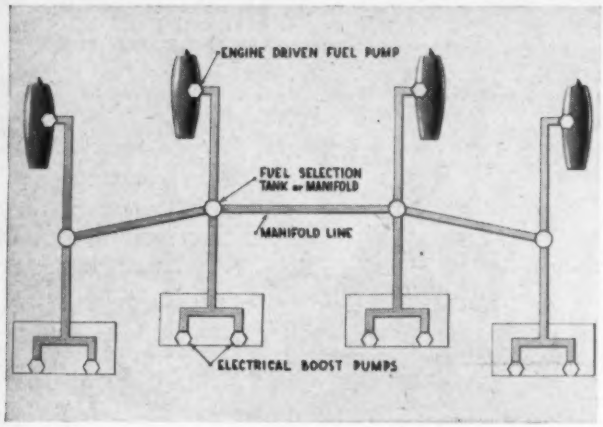
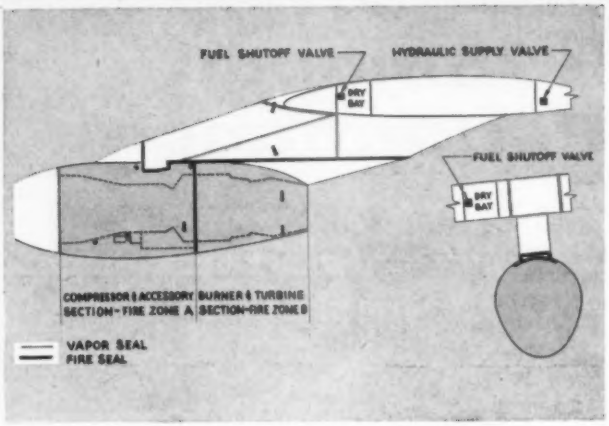


Diagram shows fuel system arrangement.



Above: Insulation of the engine pod.

crew of two pilots," Norris told IAS. Since present Civil Air Regulations require flight engineers on all aircraft weighing over 80,000 lbs., the 707 has pilot, co-pilot, and flight engineer stations (see photos). The flight engineer station is a relatively simple one without throttle controls.

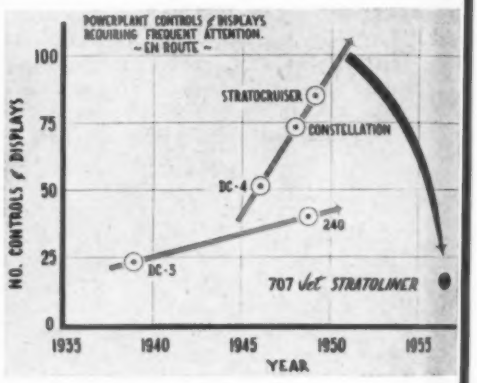
In verifying its claims, Boeing says the 707 has 115 fewer powerplant controls and displays than the Stratocruiser and "nearly 50% reduction in the number of all controls and displays over those provided" in the earlier Boeing transport (see chart). This reverses the 20-year trend in cockpit complexity, reducing this type pilot load to the level of the DC-3 once more.

The 707 meets the SAE vision angle requirements for transport aircraft and both controls and instruments are to SAE recommendations.

• **Structure:** Original estimates called for an empty weight of 88,890 lbs. Pennell told IAS the design team sought to cut this by a flat 8%, or over 7000 lbs. In fact, he said, they bettered this aim by 1000 lbs. Structural weight advantages in the 707, compared with a conventional transport, are shown here:

	Piston-Engine Transport	Jet Transport
Structure (less nacelles)	24.6%	24.0%
Powerplant (plus nacelles)	18.6%	11.2%
Fixed Equip.	10.5%	10.1%
% of T-O Wt.	53.7	45.3

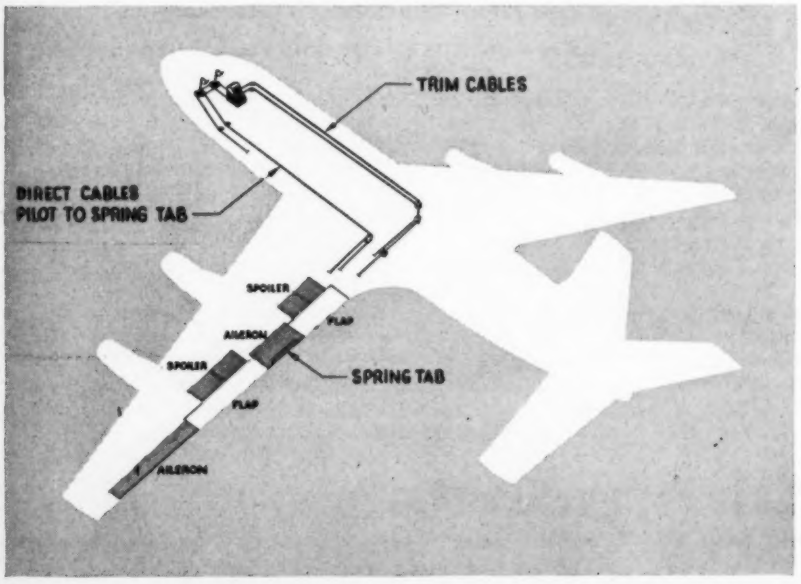
All doors and openings in the 707 are of the plug type (inward opening) to provide protection against accidental opening. Multi-path structure has been used (see page 68) throughout the aircraft. This provides two load carrying members capable of withstanding a load of three times normal values. If one element fails, the remaining load carrying member retains enough strength to assure safe flight.



Simplicity of controls is a feature.

The landing gear uses four wheel trucks on a single oleo for each main gear (see photos). The main gears retract inward into the fuselage lower lobe while the nose gear retracts forward. Landing gear doors are closed when the gear is extended as well as when retracted. Gear retraction time is 10 seconds. The nose wheel features 55° steering. • • •

Below: 707 flight control system.



Chicago-Detroit Route Likely for North Central

A 3-1 CAB decision certificating North Central Airlines for local service between Chicago and Detroit was expected momentarily at presstime. Members Gurney, Denny, and Lee favored elimination of American Airlines and substitution of North Central over the route which also includes South Bend, Kalamazoo, Battle Creek, Jackson, and Ann Arbor. Member Adams disagreed.

American will continue to operate trunk service between Chicago and Detroit.

Decisions Now Final In Transpacific And West Coast-Hawaii Cases

FINAL Presidential-signed decisions in the Transpacific Renewal and West Coast-Hawaii Cases were issued by CAB on Feb. 15, ending an uproarious two-week period of indecision and reversals. Following are the final rulings in the two cases.

• **Transpacific:**

Northwest's authorization to serve Seattle, Portland, Anchorage, and Tokyo over the Great Circle route, renewed for seven years; authorization to serve Okinawa, Taiwan, Hong Kong, and the Philippines renewed for five years; authorization to serve points within Korea renewed for three years.

Pan American's service from Hawaii to Tokyo and beyond to Hong Kong renewed for five years and between Hong Kong and points in India for three years. Also, American Samoa named in PAA's certificate in lieu of Canton Island and authorization to serve Okinawa and Iwo eliminated.

Pan Am's application to fly the Great Circle route from the U. S. to Tokyo deferred for further study and consideration. Also deferred were applications of PAA and Northwest for renewal of existing authorizations for service to points in China, and TWA's application for renewal of its Ceylon-Shanghai segment.

TWA's bid to extend its route from India to Tokyo to form a round-the-world connection with Northwest, and the certificate application of Transocean Air Lines were denied.

• **West Coast-Hawaii:**

Certificates of Northwest and Pan American for service between Seattle/Portland and Honolulu renewed for three years.

United Air Lines granted permanent rights between Los Angeles and Honolulu placing the route on the same basis as UAL's San Francisco-Honolulu route.

The CAB had voted 3-2 (Gurney and Ryan dissenting) to renew Northwest permanently to Tokyo. This was changed to a seven-year renewal by the President.

Lee and Adams dissented from the majority's denial of TWA's India to Hong Kong proposal and transocean's bid for a certificate.

The Board voted 5-0 in favor of all phases of the Hawaii Case, but was reversed by the President in connection with the Seattle/Portland-Hawaii route. CAB had recommended permanent renewal of NWA on that segment and non-renewal of PAA.

Eisenhower first changed it to renewal of PAA and non-renewal of Northwest, then switched to a three-year renewal for each carrier.

U. S. Carriers in Heated Battle for Mexico City Route

THE UNITED STATES is reported to be working on a "new angle" in an effort to come to some agreement with Mexico on reciprocal airline rights.

This fact was attributed to a State Department aide by Senator Ellender (D. La.) following a White House meeting attended by five southern Democratic senators on Feb. 15.

There were no indications of what the "new angle" might be, but Washington was virtually steaming with activity at presstime in connection with the Mexico situation, which is generally considered the hottest airline matter facing the government today.

For the past 10 years the two governments have been unable to reach agreement on air routes despite numerous conferences. During that period U. S. carriers have battled among themselves and today, American, Eastern, and Pan American are heatedly engaged in a fight over which U. S. line shall compete in the New York-Mexico City nonstop market with Air France.

The non-stop issue is before CAB and should be decided by that body in the spring. But even after a U. S. line is named there is the question of getting authority from Mexico.

Meanwhile, Eastern is battling to get a ruling on its 1947 certificate for New Orleans-Mexico City service. Following the Southern Senators' White House meeting this month, Sen. Ellender indicated the President promised quick action. The Senators were supporting EAL's bid for a go-ahead on its certificate.

Also hopeful are Western Air Lines and Braniff who, like Eastern, were granted certificates in 1947 but never have been able to activate them because of the absence of a bilateral agreement. WAL's is for Los Angeles-Mexico City service; Braniff's for Dallas-Mexico City.

Lavish Meals Planned For NWA Supers

A new automatic coffee maker which assures a fresh, hot cup of coffee at all times will be a feature of Northwest Airlines' "second-to-none" food service, to be started when Lockheed Super Constellations (1049G) are placed in service next month on the transpacific route.

NWA has also designed an electrically controlled roll warmer so that hot rolls will be available for all meals.

The coffee maker, which dispenses the correct proportions of a liquid coffee concentrate and water, is the result of a combination of design, according to John M. Arnold, NWA's director of food service. Dispensing units and solenoid valves were designed by Rudd-Melikian, of Philadelphia, while the hot water boiler came from Nordskog Manufacturing Co., Los Angeles. NWA's engineering and food service divisions designed the parts into one unit.

First-class passengers' meals are to be served Continental style—in courses—with choice of champagne or wine. There will also be before-dinner cocktails, highballs, cherry and fruit juices, plus after-dinner brandies, etc. Newly designed individual seat tables will be used in conjunction with crested linen table cloths, napkins, silverware, and a new line of dishes. Hot canapes, mints, nuts, cheese trays, and fruit baskets will be featured.

Passengers will receive souvenir menus suitable for mailing, overseas flight bags, international dateline certificates, flight sox, and Sky-Pac toilet kits. A group of pursers and stewardesses are receiving a month's special training before working the Super Connies.

Basic design of the amidships galley was planned by NWA's engineering and food service divisions in cooperation with Nordskog, manufacturer of the galley. The hot roll oven is an adaptation of a basic Mansfield design. Included in the equipment is a new automatically controlled electric refrigerator. General Electric circulating fan-type ovens will be used to restore food to the proper temperature for serving.

No Blame Found In Comet Inquiry

No one could have anticipated the series of de Havilland Comet crashes, considering the state of metallurgical science, and neither the manufacturer nor the British Overseas Airways Corp. can be blamed. This was the conclusion of the official Comet Court of Inquiry in London, as revealed in the final report, written by Lord Cohen, who presided.

The report indicated that metal fatigue was the cause of the crashes and rejected the theory that failure of a metal adhesive could have been at fault. De Havilland, which has already issued preliminary modification details for the Comet II, said it would take "careful note" of Lord Cohen's findings.

Forthcoming Comet II's will be built with a heavier gauge skin and with stress concentration areas relieved, resulting in a weight increase of 1150 lbs. This increase will be offset to some extent by 550 lbs. of weight reduction in other parts, plus an increase in the take-off rating of the Rolls-Royce engines. The Avons will be rated at 7350 lbs. static thrust, instead of 7050, and will also benefit from a reduction in specific fuel consumption. The additional thrust will permit 2700 lbs. increase in take-off gross weight, in cases where the gross was previously limited by runway length.

War Air Traffic Report Returned by CAB

An estimate of what would constitute minimum civil air traffic in case of war has been considered by the CAB and sent back to the subcommittee which produced it for further clarification. The 30-page draft report outlined passenger and cargo ton-mile traffic, but the CAB's Industry Advisory Group on Civil Air Mobilization returned it to the subcommittee for further details on what load factors, utilization, and seating densities would be involved.

Allegheny and Mohawk To Add New Planes In Spring

Three Martin 2-0-2's will be placed in service this spring by Allegheny Airlines, and three Convair 240's have been purchased by Mohawk Airlines, with deliveries scheduled for May.

The Martins were part of the equipment of California Central Airlines and its affiliate, Airline Transport Carriers, all of which was sold at auction on Feb. 14 to Allegheny and Southwest Airways. A fourth Martin was acquired by SWA in the $800,000 purchase.

The Convairs were bought by Mohawk for an undisclosed sum from CAT, SA a Panamanian corporation. These aircraft, with less than 500 hours flying time since 1949, were at one time involved in an ownership dispute between the Chinese Nationalists and the Chinese Communists. Following settlement of the dispute they were shipped to the U.S. on an aircraft carrier.

CAB Applications

Pan American World Airways applied for non-stop authority between New York and Nassau.

Resort Airlines asked to be included in new regulation which permits airlines to exchange travel space for advertising.

Eastern Air Lines asked to be made party of any investigation connected with coach fares of National and Delta/C&S between Jacksonville and Miami.

Pending Cases

An Examiner's report in the **New York-Chicago Route Case** is now being prepared for a mid-March target date.

Many airlines have petitioned for reconsideration of CAB's order setting the scope in the **New York-Florida Route Case,** but strong Congressional pressure behind the case will minimize delays.

CAB decisions in the **New York-Balbo** and **Transatlantic Cargo Cases,** currently at the White House for Presidential signature, are now promised early action by White House staffers.

KLM/WEST INDIES: Serving the Caribbean

By ANTHONY VANDYK

CURACAO, Dutch West Indies—KLM Royal Dutch Airlines last month quietly celebrated its 20th year of scheduled service in the Western Hemisphere.

It was on Jan. 19, 1935 that KLM's West Indies Division started scheduled operations using a high-wing three-engine Fokker F-18 which the previous month had been flown to Curacao from Amsterdam via Marseilles, France; Alicante, Spain; Casablanca, Morocco; Porto Praia, Cape Verde Islands; Paramaribo, Surinam; and La Guaira, Venezuela.

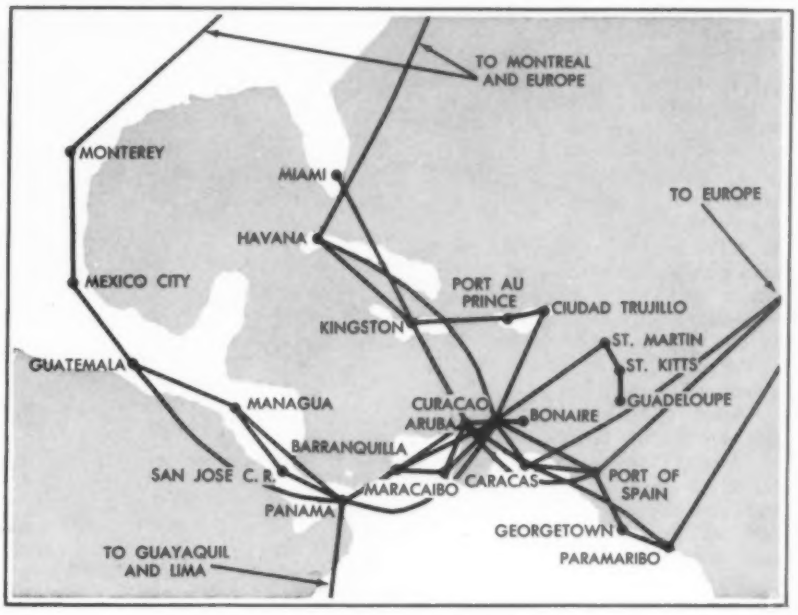
In the past 20 years the West Indies Division has developed from an isolated operation serving a few territories in the southern Caribbean area to an important and essential part of the KLM system (to which it was finally connected in February 1946). For a period during World War II it was KLM's only autonomous operation (the few DC-3's based in England operated under charter to BOAC).

Today the West Indies Division has three major roles:

• **It feeds** both the north and central Atlantic routes, thereby enabling passengers from Europe to enjoy one-carrier service to most major points in the Caribbean area, northern South America, and Central America.

• **It connects** the U. S. with the Dutch West Indies. Every morning at 8 a. m. a KLM plane leaves Miami for points south (KLM is proud to be the only European airline to provide through one-plane service between North and South America).

• **It connects** the six islands of the Dutch West Indies and links these islands with the other Dutch territory in the Western Hemisphere: Surinam (formerly known as Dutch Guiana).



WESTERN HEMISPHERE ROUTES of the Royal Dutch Airlines.

The third role is likely to become increasingly important since under their new statute of complete internal autonomy, proclaimed at the end of last year, the two territories have agreed to cooperate in financial, economic, and cultural fields. Such cooperation will obviously involve increased travel.

KLM's contribution to the economy of the Dutch West Indies is substantial. On the two principal islands of Curacao and Aruba the annual payroll amounts to some $2,250,000, while miscellaneous expenditures on these two islands total about $500,000 a year. The West Indies Division has a staff of 1000, with 750 employees located in the Dutch West Indies alone. There are 86 flying personnel based at Curacao, including 38 pilots, 20 flight engineers, 19 stewards, and 9 stewardesses. In addition to its own 11 aircraft (four Convair 340's and seven DC-3's) the division provides the crews for the Curacao-Guayaquil-Liama and Mexico City legs of Amsterdam-based intercontinental aircraft.

• **The West Indies Division fleet** is looked after by one of the finest overhaul and maintenance shops south of Miami. These facilities have taken care of all the various types of aircraft which the division has operated: high-wing Fokkers, twin-engine Lockheeds, DC-5's (the high-wing 18/22-seat Douglas model), D-3's, DC-4's, and Constellations.

Today the Curacao shops employ about 180 men on DC-3 and Convair 340 maintenance and overhaul work and on DC-6B and Super Constellation turn-rounds. Every DC-3 part (including the R-1830 engines) is overhauled by the division's shops, but the Convair's R-2800 engines are sent back to Amsterdam for overhaul (the only part of the aircraft itself which is not overhauled in Curacao is the compressor). When the division was operating DC-4's the shops handled R-2000 overhauls.

KLM would like to see airlines from

PANAMA: DC-6B (left) from Europe and Canada and a DC-3 (right) from Costa Rica connect with a 340 bound for Colombia and Dutch West Indies.

nearby countries use the facilities at Curacao in the same way that numerous operators have overhaul and maintenance work performed by the airline's Amsterdam shops.

The West Indies Division is getting a daily utilization of more than five hours from its four-plane Convair 340 fleet. Overhaul life of the R-2800 engines is 1450 hours while that of the R-1830's is 1100 hours. Three of the division's DC-3's have airframe times of over 20,000 hours.

• **The biggest problem** for the maintenance shops is corrosion since the aircraft are near the sea almost all the time. Frequent inspections and painting of the skin (light grey is the color used) are the principal methods used to combat corrosion.

Apart from the shops, KLM maintains several other facilities at Curacao's Dr. Albert Plesman airport, including a hotel for transient passengers and a large commissary. The latter supplies 3600 full meals each month plus an equal quantity of snacks. It uses 3300 lbs. of meat, 3700 lbs. of butter, 6600 eggs (to quote a few examples) each month. KLM's passenger service in the West Indies Division is a lavish and excellent as it is in other parts of the world.

• **All of KLM's food** supplies are imported since the island of Curacao produces no edible commodities (it doesn't even have any water of its own—the water used is distilled from the sea). The reason for Curacao's prosperity is that it is the site of the world's second largest oil refinery.

The only other "industry" is tourism. Tourists are particularly attracted to the island because it has very low import duties 2-3%), with the result that prices of imported goods are lower than almost anywhere else in the Western Hemisphere. The local government is considering making Curacao a free port which will considerably increase its importance as a trading center.

ARUBA'S terminal competes with Curacao for fine facilities.

Because Curacao is a barren island much of the West Indies Division's cargo traffic comprises food and flowers. Other staple items of air cargo include tropical fish, textiles, cigars, and phonograph records (Venezuela imports substantial quantities of Mexican records). But most of the freight is southbound and return loads constitute a real problem.

• **Freight is not the only problem.** Because of restrictions imposed on traffic rights by many governments, KLM has a hard time reaping the return to which it should be entitled from its pioneering effort in the Caribbean. Nevertheless, in 1954 the division carried 110,000 passengers and sold 5 million ton-miles. Unfortunately, today it is a long way from being financially self-sufficient and a "streamlining" program is in progress under direction of KLM vice-president V. H. L. Dubourcq, who has just been detached from the head office in Holland for this purpose.

Because of special conditions in the area which it serves and the fact that it is unsubsidized the division needs: (1) aircraft which combine the Convair 340's performance and comfort with the freight capacity of the DC-4; and (2) a less restrictive policy regarding traffic rights in the countries where it flies.

Given these two things the division should be economically as successful as it is operationally. • • •

CURACAO also has extensive overhaul facilities.

Twin-Engine Advanced Trainer Announced by Link

A twin-engine, two-place procedures and navigational flight trainer is being designed and built by Link Aviation, Inc. for Flight Safety, Inc. of La Guardia Airport, N. Y. to be used in its program for advanced training of business aircraft pilots.

Designated the E-600 and called the Flight Translator, it is being designed to specifications prepared by Flight Safety. Delivery will be late this year or early in 1956.

First of its kind to be sold commercially, the trainer will have a DC computer system incorporated. It will be designed to simulate two complete and independent powerplants found in a typical twin-engine aircraft. Full radio facilities will be provided to allow for simulation of complex radio problems encountered in high-density areas.

Radio equipment will include: two ADF's; two ILS-VOR receivers; marker-beacon receiver; two VHF receivers; HF transceiver; isolation amplifier; interphone; and master control panel. Four radio stations will be available for simulation, providing any combination of broadcast—homing, A-N range, VOR, ILS, GCA, and marker beacon.

The Translator will also be equipped to train crews in emergency procedures by simulating partial or complete power failure in one or both engines, engine fire, radio or instrument failures, wing icing, and others.

New 3-Phase HIGH ALTITUDE INVERTERS deliver full load at 50,000 feet!

Truly effective, upper altitude performance

The new Jack & Heintz inverters, Models F138-1 and F148-1, deliver full-rated load up to 50,000 feet, half-rated load up to 65,000 at +20°C ambient! Performance is increased; size and weight reduced . . . with diversity of outputs available as shown in the table below.

Unrestricted air flow solves heat problem

Self-ventilated and self-contained, these inverters utilize a large commutator with staggered brushes. Air flows freely over commutator and through the unit. Fans are mounted on each end of the rotor to cool the a-c and d-c sections separately. Partial bleeding of this air cools the control box.

Installation and maintenance advantages

A single, compact, plug-in control unit combines both frequency and voltage controls. New two-stud d-c terminal block for d-c input connection is provided . . . plus an AN connector for a-c power output. This connector and voltage adjustments are mounted on d-c end of control box for easy installation and maintenance.

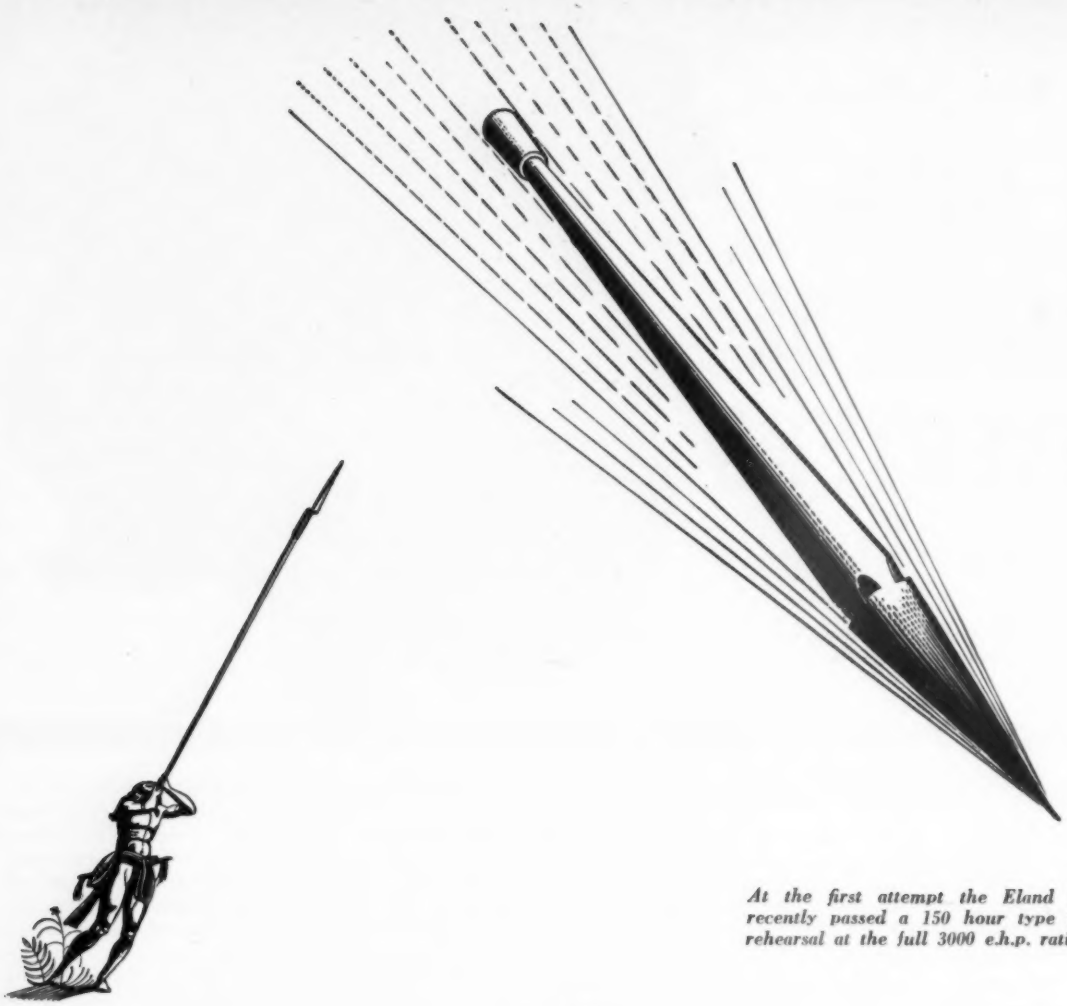
Jack & Heintz builds special high altitude inverters or other electrical equipment to meet your *specific* needs. Write Jack & Heintz, Inc., 17633 Broadway, Cleveland 1, Ohio. Export Department: 13 East 40th Street, New York 16, N. Y.

OPERATING CHARACTERISTICS	F138-1		F148-1	
	Three Phase	Single Phase	Three Phase	Single Phase
Output Rating				
Full Load va, Sea Level to 50,000 Ft	1500	1250	2500	2250
Full, 50,000 Ft to 65,000 Ft	750	750	1250	1250
A-c Voltage—Volts	115/200	115	115/200	115
Voltage Range—All Environments	110-120/190.5-208		110-120/190.5-208	
Frequency Range—All Environments (cps)	390 to 410		390 to 410	
Power Factor	90% Lag to 95% Lead		90% Lag to 95% Lead	
Input Voltage—d-c (volts)	26.0 to 29.0		26.0 to 29.0	
Ambient Temp Limits at Sea Level—F. L.	−55°C to +85°C		−55°C to +85°C	
Ambient Temp Limits at 50,000 Ft—F. L.	+20°C Max		+20°C Max	
Drawing Specifications	54A3B806		54A3B807	
Design Specifications	AN-I-10b		AN-I-10b	
Weight—Lb	43		60	

Military specification numbers as used herein are for purposes of product identification only and do not necessarily imply specification conformity.

JACK & HEINTZ Automatic AIRCRAFT EQUIPMENT

Circle No. 26 on Reader Service Card.



At the first attempt the Eland has recently passed a 150 hour type test rehearsal at the full 3000 e.h.p. rating.

HIGH AERODYNAMIC EFFICIENCY

The Eland is an aero-engine giving high power at low cost. It is a single-shaft propeller-turbine developing 3,000 e.h.p. at take-off, with a diameter of only 36 inches. This compactness makes for high aerodynamic efficiency. Other notable features include smooth, surge-free acceleration, low specific weight and low fuel consumption. All in all, the Eland is an impressive example of design and manufacture at the service of commercial aviation.

NAPIER Eland

Partners in Progress with The ENGLISH ELECTRIC Company Ltd.
D. NAPIER & SON LIMITED · LONDON, W.3.

International Aviation

By Anthony Vandyk

ONLY 16% OF ALL transport aircraft accidents reported to the International Civil Aviation Organization in 1953 occurred during the take-off and climb stage; 44% occurred during the en route phase (of these, 50% involved collision with terrain or water); and 40% occurred during the approach and landing stages. Of these, 56% involved collision with terrain or water. This information is brought out in the latest (No. 5) ICAO Aircraft Accident Digest. At $2 (Canadian) it is a bargain.

* *

OF ALL THE ACCIDENTS, 55% were reported to have been probably due to pilot error. Two of these were due to descent below minima, two to deviation from established approached procedures, five to flying into IFR conditions while on VFR, two to miscalculation of fuel, two to inattention to the fuel system, and two to turning too steeply and at too low a height during the critical climb phase.

* *

THE ICAO digest contains reports on four 1953 accidents which were due to inadequate maintenance of the aircraft. In the first, the aircraft landed heavily and was damaged through lack of elevator control due to the loosening of the elevator control rod as the result of the absence of locking pins on the nut and bolt fixtures of the elevator bars' control links.

* *

IN THE SECOND, while the aircraft was en route and in IFR conditions, one engine failed due to faulty spark plugs, causing excessively high operating temperatures and bearing loads by detonation and pre-ignition. Shortly afterward, the second engine failed for similar reasons and the aircraft, unable to maintain altitude, collided with high terrain.

* *

IN THE THIRD "maintenance" accident, reverse installation of the controls caused loss of control (although the pilot checked his controls for movement before take-off, he did not check them for *correct direction of movement*). In the fourth accident, an elevator failed while the aircraft was landing, causing loss of control. It was established that, due to poor maintenance and inspection, a hinge bolt fell out.

Rearward Seating for Aussie Airlines

ALL NEW COMMERCIAL aircraft coming into service in Australia after Dec. 31, 1956 will have to be fitted with rearward-facing seats under new regulations announced by Sir Richard Williams, Director of Civil Aviation. The requirement will apply to all aircraft designed in Australia, all aircraft first of a type imported after Dec. 31, 1956, and all modified seat installations which are completed after Dec. 31, 1956. Retrospective action will not be required on aircraft of types already on the Australian register as of Jan. 1, 1957.

Transport Briefs

Philippine Air Lines has ordered three 1-seat DeHavilland-Canada Otters . . . **Qantas Empire Airways** now operates all its Sydney-London flights with Super Constellations. It will substitute DC-4's for Short Sandringham flying boats on its Pacific islands services . . . Trans-Australia Airlines' Viscounts had a load factor of 92% in their first five weeks of operation.

Lloyd Aeroe Colombiano is a new Colombian carrier which has started operations with a fleet of DC-3, Cessna 310, and Piper aircraft. It is planning to buy three DC-4's for March delivery and may also order DC-6's. Chile's **Linea Aerea Nacional** has obtained Chilean authorization to operate from Santiago to Los Angeles via Lima, Panama City, and Mexico City . . . **Aeronaves de Mexico** has opened DC-4 service from Tijuana, on the U. S. border, to La Paz and Acapulco . . . Colombia's **AVIANCA** has acquired two additional DC-4's bringing its fleet to 78 aircraft, including 15 DC-4's.

Air-India International plans to increase its service to London from four to six roundtrips weekly this spring . . . **Scandinavian Airlines System** reports a surplus of $1.3 million for its fiscal year ended Sept. 30, 1954 . . . Iceland's **Flugfelag Islands** plans to open a Reykjavik-Oslo-Stockholm service on May 1 . . . Yugoslavia's **JAT** plans to start operations to Beirut, Cairo, Ethiopia, India, and London . . . Czechoslovakia's **CSA** has opened a twice-weekly Prague-Paris service with Ilyushin 11-12 equipment . . . **Ostermans Aero,** Swedish helicopter operator, has ordered three more Bell 47G's, bringing its fleet to 10 Bell 47's and one Sikorsky S-55.

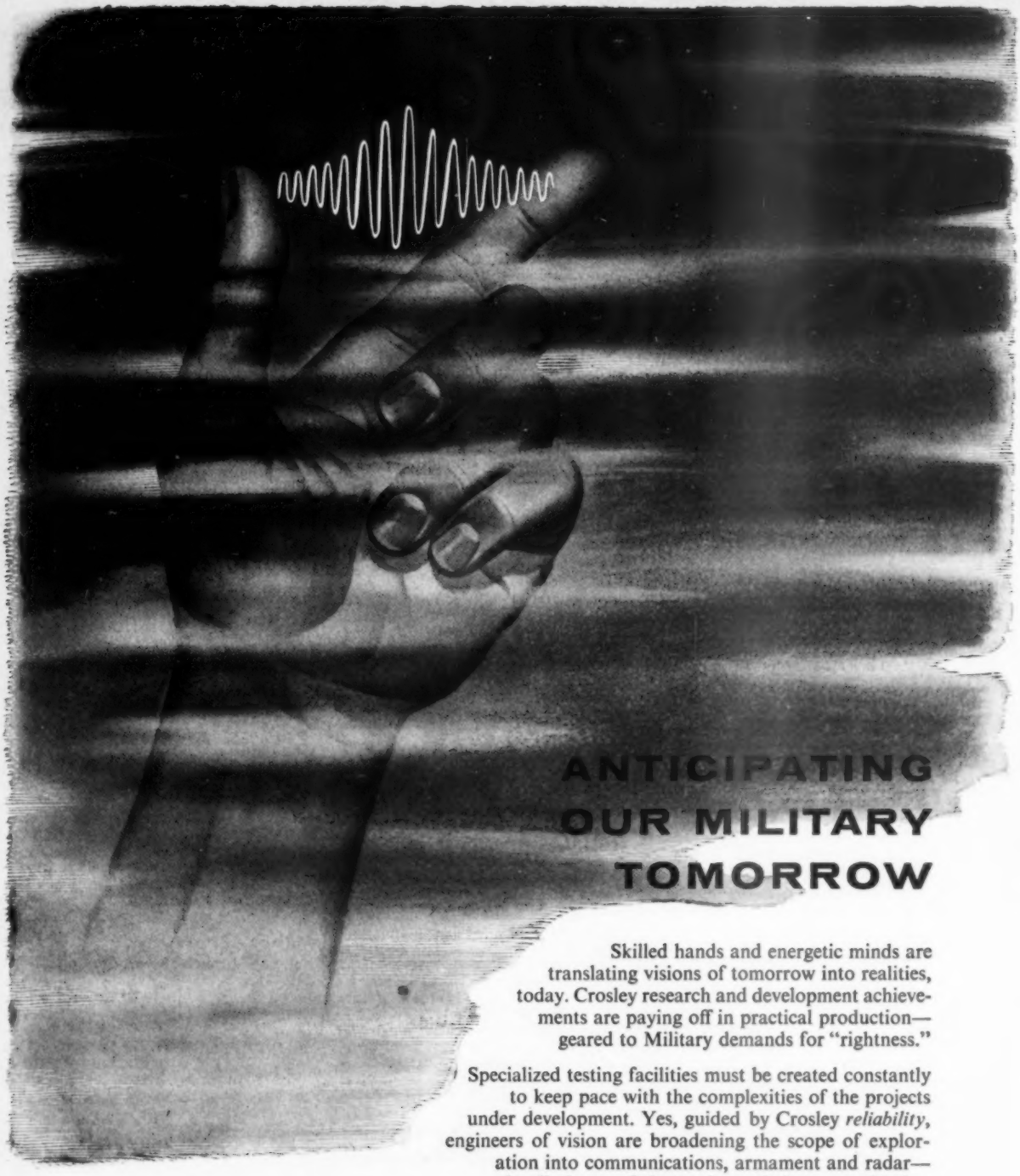
Airwork Ltd. will operate one of its two weekly trans-Atlantic all-cargo services with a DC-6A chartered from Slick Airways at $560 per hour and the other with a Transocean Air Line's DC-4 at $10,000 a round trip.

Japan's **Kawasaki Aircraft** recently delivered the first of a batch of Allison J33 jet engines to the U. S. Far East Air Forces. They had been overhauled and rebuilt by Kawasaki, supported by Lockheed Aircraft-Overseas Inc. . . . **De Havilland-Canada** has produced over 770 Beaver transports to date . . . France's **SFERMA** is converting 200 SNCASO Bretagne transports for use by the French Navy . . . The **Leduc** plant near Paris was badly damaged by the flooding of the Seine last month. Some 10,000 manhours were lost but the 022 ramjet aircraft program was not affected (the first prototype is due to fly in September) . . . **SFECMAS** has been merged with SNCA du Nord as the latter's guided missile division . . . **Fouga** has received a French Navy order for two navalized 170M Magister jet trainers . . . **SNECMA** is flight testing an Ecrevisse pulsejet VTO rig. **Britain's aircraft exports** in 1954 totaled $156,940,904, against $185,196,337 in 1953 and $126,508,740 in 1952. . . **Napier** has delivered 100 license-built Rolls-Royce Avons to date. . . Italy's **Piaggio** company has signed an agreement with Professor Blume, representing a German industrial group, for German license production of the Piaggio 148 and 149 trainers. . . Japan's **Sumitomo Metal Industries** is to open a new plant this spring at Kanzaki near Osaka, where it will build and repair Hamilton Standard propellers and jet engine accessories. . . **Bristol** is starting production of pressure-moulded asbestos-plastic drop tanks in standard sizes for 50, 100, 150, 200, 300, and 500 Imperial gallons.

Military Briefs

The French Naval Air Service in 1954 logged 131,500 flying hours as compared to 100,760 in 1953. Its first Aquilon (Sea Vemon) squadron was recently formed. . . **The Dutch Air Force** had 48 crashes in 1954, 15 of which were fatal. The comparative figures for 1953 were 60 and 14. Flying hours in 1954 were some 50% greater than in 1953.

FIRST PRODUCTION Blackburn & General Aircraft Beverley has made its first flight with four 2850-hp Bristol Centaurus engines. It takes off with a 50,000-lb. payload in 2370 ft.; gross is 135,000 lbs.



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EN ROUTE . . .

WAYNE W. PARRISH

I never know what the next mail will bring

BEING sort of a pursy losel given to traiking over the aretes and moors like a sheman (words like them don't hardly come easy no more), I never know what the next mail's going to bring these days.

Just like when the postman arrived with an important-looking envelope from the State House of Nebraska. Opening it up, I discovered that Governor Robert Crosby had made me a full-fledged Admiral in the Great Navy of Nebraska. Not only do I have a card for my wallet, but I have a handsome certificate which I'm having framed.

All I can say is that the next time the Missouri River floods and covers Omaha's Municipal Airport the boys standing on the roofs of the hangars and administration building had better give me proper salutes as I pass by on the roof of a henhouse as I float down the river to Kansas City. That's about the closest connection between a Navy and Nebraska I can think of.

And please, Governor Crosby, let's not have another war between the states. I'm both a Colonel and an Admiral down in Oklahoma—a state which has even less need of a Navy—and I don't want to have to make a choice about which side I'm to fight on.

On another subject, I seem to get mixed up in some very interesting extra-curricular activities, quite apart from traveling in foreign countries (a trip is coming up again soon).

One of these activities happened right after Christmas. The supervisors' club of Western Air Lines decided to pull a surprise on the boss man, Terry Drinkwater, at their annual party. They decided to work up a take-off on the TV program, "This is Your Life." Along with friends and relatives from Terry's home town of Denver, two of us from Washington were invited. I was very pleased to join Burton Kaynor, the Sheraton-Carlton bellhop known far and wide as "The Judge," in being a participant.

So all of us surprises sneaked into Los Angeles and were kept under wraps at the Hollywood Roosevelt Hotel until the night of the banquet. Then we were taken to the Moulin Rouge nightclub (most for your money of any nightclub in the world) for dinner and at 9 o'clock were whisked out to the Miramar in Santa Monica where the banquet was in progress. We were taken through the kitchen to a room back of the stage and then as the program got underway, to a very surprised Drinkwater, we were brought out on the stage one by one. The WAL boys did a smooth and highly professional job and everybody had a lot of fun.

Here is Actress June March as "Miss Soo-Pah-Kah-Nee." (Get it?) Left is a simian filled with ichor, right is Jim Mariner, NWA's v.p.-sales, looking like an evocator about to have an ictus. (That'll fool you!)

More recently I was up in Minneapolis, which is hardly my choice for a winter resort, to make a couple of speeches. One talk was to the aviation committee of the chamber of commerce and the other was to the banquet winding up the annual sales conference of Northwest Airlines.

Between the speeches I got the full hospitality treatment of Minneapolis-Honeywell, a great company doing great things for the aviation industry as well as making life more comfortable in homes with that line of first-class thermostats. Steve Keating, head of the aviation division, is as smart an hombre as they come, and not far behind him is 6-foot Russ Whempner who must have been a fullback on a football team and with whom I hope I never tangle. I saw some of the new things going on in the plant and they were kind enough to give a cocktail party for me to which aviation folk of Minneapolis were invited. One of those attending was Zeus Souchek of General Mills, one of the famed Souchek brothers. I also had a chance to visit The Cornelius Corporation and get to know a real genius. Cliff Cornelius, who has an idea a minute and who's thriving very well on his inventions.

But the Northwest banquet was a study of contrasts which must have given the other patrons of the Nicollet Hotel a jolt. It was very cold and snowing outside, but somebody cooked up the idea that everybody at the banquet should wear flimsy Hawaiian shirts. Even that brilliant scholar and sophisticated patron of the arts, Bert Holloway of Lockheed, had to break down his cosmopolitan dignity and wear one of those shirts, a transformation which made him look just like any other guy. Quel Horreur!

The menu was all based on stuff from Alaska and as far as I am concerned, Alaska can keep a complete monopoly on moose meat. I'll stick to beef for steaks. I never knew how tough those moose were. But it was a swell occasion and I was glad to see how high the NWA morale has become after a long series of setbacks.

Of course every sales conference has a theme and glamor. The theme had something to do with Indians, so Actress June March had a name (see photo) resembling a Lockheed product NWA is shortly to put into service.

Our hero W. W. P. steps from behind the curtain to be one of the surprise guests for the takeoff of "This is Your Life" which employees gave for T. C. Drinkwater, Western Air Lines president.

Just being coy?—or was it a green persimmon? Or maybe it w the thought of wine on top of scotch and sodas that caused WW to wince while Stewardess Griggs poured for NWA Pres. Nyro

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M. Michael Cerick has been appointed advertising representative for American Aviation Publications. He will handle advertising sales in Manhattan for AMERICAN AVIATION magazine, *American Aviation World-Wide Directory*, and *Official Airline Guide*.

An alumnus of Columbia University, Cerick started his advertising sales career with the *Wall Street Journal*, handling industrial accounts in New York and Chicago. Most recently he was on the staff of *Woman's Day*.

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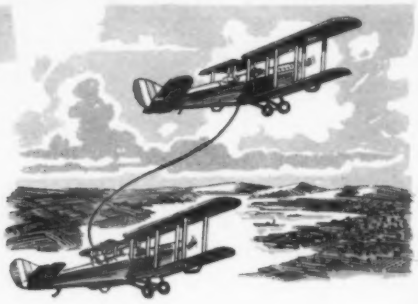

Even in the early days of aviation, far-seeing airmen were already visualizing the possibilities of mid-air refueling for long-range, non-stop flights. The first serious experiment was made by the U. S. Army in June, 1923, when two fliers in an Army DH-4BM, refueling in mid-air over San Diego, California, stayed aloft four days.

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Jim Ray

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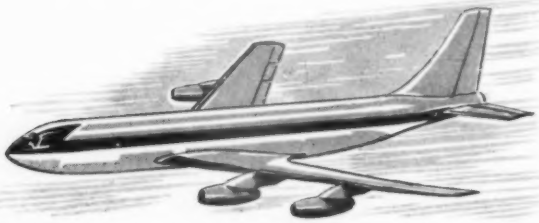
The new U. S. Air Force Boeing KC-135 jet tanker (below), soon to go into service, will refuel jet bombers flying at a speed of more than 600 miles per hour.



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